

**Table of contents**

**Instructions: W0010021**

**Product: T1 alternator**  
**Part no.: 0 120 689 5.**

<b>Special features</b>	<b>I02/1</b>
<b>Structure, usage</b>	<b>I06/1</b>
<b>General information</b>	<b>I07/1</b>
<b>Safety measures</b>	<b>I08/1</b>
<b>Testers, equipment, tools</b>	<b>I11/1</b>
<b>Lubricants</b>	<b>I16/1</b>
<b>Test values and settings</b>	<b>I18/1</b>
<b>Tightening torques</b>	<b>I20/1</b>
<b>Circuit diagram</b>	<b>I22/1</b>
<b>Alternator Disassembly/-Test -Table</b>	<b>I27/1</b>
<b>Component cleaning</b>	<b>III04/1</b>
<b>Alternator assembly table</b>	<b>III05/1</b>

**Continue: I01/2**

**Table of contents**

<b>Editorial note</b>	<b>III28/1</b>
-----------------------	----------------

**Continue: I01/1**

## SPECIAL FEATURES

The microcard contains repair instructions together with the appropriate test specifications for the following alternators:

0 120 689 5 ..

T1 (RL)	28V	53/100A
T1 (RL)	28V	58/105A
T1 (RL)	28V	65/120A
T1 (RL)	28V	70/140A

Continue: I02/2

## SPECIAL FEATURES

### N O T E:

These instructions do not apply to double-T alternators

On the 0 120 689 562 version and on a few alternators with higher part no., the drive ball bearing in the drive-end shield is of press-fit design.

Continue: I03/1

## **SPECIAL FEATURES**

### **N O T E:**

**These instructions do not cover alternators with 180 A rated current.**

**The various alternator designs can be seen from the corresponding service parts lists.**

**Continue: I03/2**

## **SPECIAL FEATURES**

### **N O T E:**

**These repair and test instructions were compiled on the basis of the alternator 0 120 689 543.**

**Continue: I04/1**

## **SPECIAL FEATURES**

**Alternators of the long-life type are integrated.**

**The main special features of the alternator are as follows:**

- \* Water drain channels**
- \* Enhanced corrosion protection with air-intake cover**
- \* Cannot be re-lubricated**
- \* Maintenance-free service life of between 200 000 and 300 000 km**
- \* Maintenance-free rolling bearings**

**Continue: I04/2**

## **SPECIAL FEATURES**

**The alternator housing is made of die-cast aluminum. Particular care must therefore be taken when dismantling and assembling, as the housing can easily become damaged. Deformation and surface damage may permanently impair the fit accuracy of the alternator components, which in turn may result in alternator damage during operation.**

**Continue: I05/1**

## SPECIAL FEATURES

Alternator, e.g.: T1 ( ) 28 V 70/140A

T: = > Outer diameter

G =	100	...	109	mm
K =	120	...	129	mm
N =	130	...	139	mm
T =	170	...	199	mm
U =	above		200	mm

l: = > Type

- 1 Claw pole
- 2 Salient pole
- 3 Windingless rotor

Continue: I05/2

## SPECIAL FEATURES

T1 ( ) 28 V 70/140A

( ): = > Direction of rotation

(->)	or R	= clockwise
(<-)	or L	= counter-clockwise
(<->)	or RL	= clockwise and counter-clockwise

28V: = > Voltage in V

70: = > Current at 1500 min<sup>-1</sup>

140A: = > Rated current in A measured  
at n = 6000 min<sup>-1</sup>

Continue: I01/1

## STRUCTURE, USAGE

PC user prompting:

Position cursor on button and confirm.

Microcard user prompting:

User prompting is provided on every page e.g.:

- Continue: I 17/1

- Continue: II 18/1      Fig.: II 17/2

Brief instructions may include several rows of coordinates.

I../. = first coordinate row

II../. = second coordinate row

III../. = third coordinate row

etc.

.../1 = upper coordinate half

.../2 = lower coordinate half

Continue: I01/1

## **GENERAL**

**Expert repairs are only possible using the prescribed tools and measuring instruments, which are in perfect working order. We therefore recommend that exclusive use be made of the tools listed.**

**The use of incorrect and unsuitable tools and testers can lead to injury and may damage the product concerned or its component parts.**

**Continue: I07/2**

## **GENERAL**

**Only use replacement parts given in the service parts list for the type of alternator concerned.**

**Proper functioning presupposes use of the lubricants specified in these instructions, both prior to and during assembly.**

**Absolute cleanliness is to be ensured when performing repair work.**

**Continue: I01/1**

**SAFETY MEASURES**

**A T T E N T I O N : F I R E R I S K**

For interference suppression, alternators are fitted with capacitors with a long storage time.

When washing out components, capacitor discharge may occur on immersing components in cleaning fluids, thus possibly causing inflammable liquids to catch fire.

Continue: I08/2

**SAFETY MEASURES**

For this reason, components with capacitors are only to be washed out in HAKU 1025/6.

Continue: I09/1



## **SAFETY MEASURES**

**Always heed the following safety regulations:**

- \* German Order governing the use of flammable liquids (VbF).**
  - \* Accident prevention regulations for electrical systems and equipment.**
  - \* Safety regulations for the handling of chlorinated hydrocarbons:**
    - For companies: ZH 1/222**
    - For employees: ZH 1/129**
- issued by the German industrial liability insurance associations (central association for accident prevention and industrial medicine), Langwartweg 103, 53129 Bonn.**

**Continue: I09/2**

## **SAFETY MEASURES**

**Outside Germany, pay attention to appropriate local regulations.**

**Skin protection:**

**To avoid skin irritation when handling oil and grease, apply hand cream before starting work and wash cream off when finished with soap and water.**

**Continue: I10/1**

## **SAFETY MEASURES**

### **Component cleaning:**

**Only use compressed air (max. 4 bar) and a clean cloth for cleaning armature, excitation winding and alternator plate.**

**Never use liquid cleaning agents.**

**Other parts, such as intermediate bearing and drive-end bearing can be washed out in a standard cleaner which is not readily flammable.**

**Take care never to inhale vapors.**

**Continue: I10/2**

## **SAFETY MEASURES**

**Avoid fire, naked flames and sparks.**

### **A T T E N T I O N:**

**Thoroughly dry cleaned parts, as gases form and may cause an explosion.**

**Only use the stated tools. Injuries cannot be precluded if use is made of incorrect and unsuitable tools and testers.**

**Continue: I01/1**

**TESTERS, FIXTURES, TOOLS****Testers:**

Tool board:	0 986 618 010 (KDLJ T 100)
Interturn short-circuit tester:	0 986 619 110 (KDAW 9978)
Test prods: or Old version:	0 986 619 101 0 986 619 114

**Continue: I11/2****TESTERS, FIXTURES, TOOLS****Testers:**

Universal measuring instrument MMD 302:	0 684 500 302
or Electrical-system tester ETE 014.00:	0 684 101 400
Dial indicator:	1 687 233 011
Magnetic measurement stand:	4 851 601 124
Alternator tester WPG 012.00:	0 684 201 200

**Continue: I12/1**

**TESTERS, FIXTURES, TOOLS****Tools:**

<b>4 feeler gauges: 0.15 ... 0.6 mm</b>	<b>0 986 618 378 (KDZV 7399)</b>
<b>Mandrel press:</b>	<b>comm. avail.</b>
<b>Clamping support:</b>	<b>0 986 619 362 (KDAW 9999)</b>
<b>Two V-blocks:</b>	<b>comm. avail.</b>

**Continue: I12/2****TESTERS, FIXTURES, TOOLS****Tools:**

<b>Clamping fixture for belt pulley:</b>	<b>0 986 618 107 (KDLJ 6006)</b>
<b>Clamping pin for mandrel press:</b>	<b>0 986 618 124 (KDLJ 6010)</b>
<b>Extractor for cylindrical roller bearings:</b>	<b>0 986 618 121 (KDLJ 6009)</b>
<b>Pressing-out tool for cylindrical roller bearings:</b>	<b>0 986 618 139 (KDLJ 6021)</b>

**Continue: I13/1**

**TESTERS, FIXTURES, TOOLS**

**Tools:**

**Pressing-in mandrel for  
cylindrical roller  
bearings: to be improvised**

**Pressing-in tool for  
cylindrical roller bearings  
and radial seal: 0 986 618 125  
(KDLJ 6011)**

**Pressing-on mandrel for spacer  
ring, cylindrical-roller bearing  
inner race and 0 986 618 134  
collector ring: (KDLJ 6018)**

**Continue: I13/2**

**TESTERS, FIXTURES, TOOLS**

**Tools:**

**Pressing-out ring for 0 986 618 127  
rotors: (KDLJ 6013)**

**Pin for aligning drive-  
end bearing and collector-  
ring end shield: 0 986 618 128  
(KDLJ 6014)**

**Continue: I14/1**

**TESTERS, FIXTURES, TOOLS**

**Tools:**

**Pressing-out mandrel for  
slip bushing:** 0 986 618 129  
(KDLJ 6015)

**Support and backing mandrel  
for slip bushing:** 0 986 618 130  
(KDLJ 6016)

**14 mm hexagon-socket  
wrench:** comm. avail.

**Continue: I14/2**

**TESTERS, FIXTURES, TOOLS**

**Tools:**

**Puller for ball-bearing  
inner race:** 0 986 619 269  
(KDAW 9996)

**Puller bell:** 0 986 619 214  
(KDAW 9995/0/1)

**Threaded pin with clamping  
bolt from tool board:** 0 986 619 250  
(KDAW 9995/14)

**Spring collet:** 0 986 619 233  
(KDAW 9995/6)

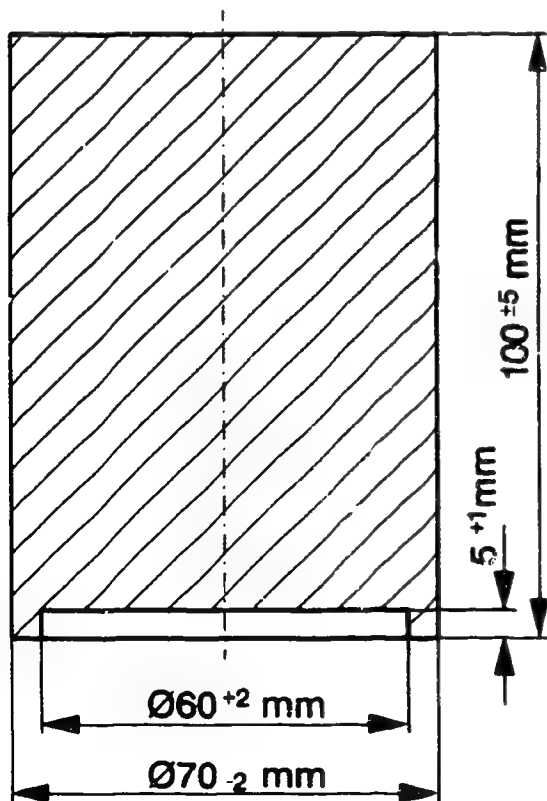
**Continue: I15/1**

TESTERS, FIXTURES, TOOLS

Pressing-in mandrel for cylindrical roller bearing:

Continue: I01/1      Fig.: I15/2

KME00385



## LUBRICANTS AND ADHESIVES

Rolling-bearing grease Ft1 v 34:	5 700 009 000
Rolling-bearing grease VS 15164-Ft:	5 975 560 000
Molycote paste Ft 70 v 1:	5 700 040 000

Continue: I16/2

## LURICANTS AND ADHESIVES

Quantities of grease 5 700 009 000  
to be applied:  
(re-lubrication version)

For deep-groove ball bearing:	9...10g
For cylindrical roller bearing	3g
For radial seal of drive- end bearing	4g
For radial seal of collector- ring end shield	2g

Continue: I17/1



## LUBRICANTS AND ADHESIVES

Quantities of grease 5 975 560 000  
to be applied:  
(non-relubrication version)

For cylindrical roller bearing base 2g

For radial seal of collector-  
ring end shield 2g

For cylindrical roller  
bearing 2 ... 2.5g

Continue: I01/1

## TEST SPECIFICATIONS AND SETTINGS

Interference-suppression capacitor:  
1,8...2,6 microfarad

Damping resistor at W:3,1...3,5 kOhm

Versions:

0 120 689 532

0 120 689 566:

1 kOhm

Stator resistances:

T1 (RL) 28V 53/100A : 0,071 Ohm + 10 %

T1 (RL) 28V 58/105A : 0,071 Ohm + 10 %

T1 (RL) 28V 65/120A : 0,047 Ohm + 10 %

T1 (RL) 28V 70/140A : 0,036 Ohm + 10 %

Continue: I18/2

## TEST SPECIFICATIONS AND SETTINGS

Rotor resistances:

T1 (RL) 28V 53/100A : 8,5 Ohm + 10 %

T1 (RL) 28V 58/105A : 8,5 Ohm + 10 %

T1 (RL) 28V 65/120A : 7,5 Ohm + 10 %

T1 (RL) 28V 70/140A : 7,5 Ohm + 10 %

Continue: I19/1

## TEST SPECIFICATIONS AND SETTINGS

One-sided air gap between rotor  
and stator: > 0,30 mm

Eccentricity:  
OD of rotor: 0,05 mm

OD of collector rings: 0,03 mm

Continue: I19/2

## TEST SPECIFICATIONS AND SETTINGS

Collector-ring diameter (new): 32,5 mm

Collector-ring diameter  
(used) min.: 31,5 mm

Brush projection (new): > 16,0 mm

Brush projection  
(used) min.: 7 mm

Continue: I01/1

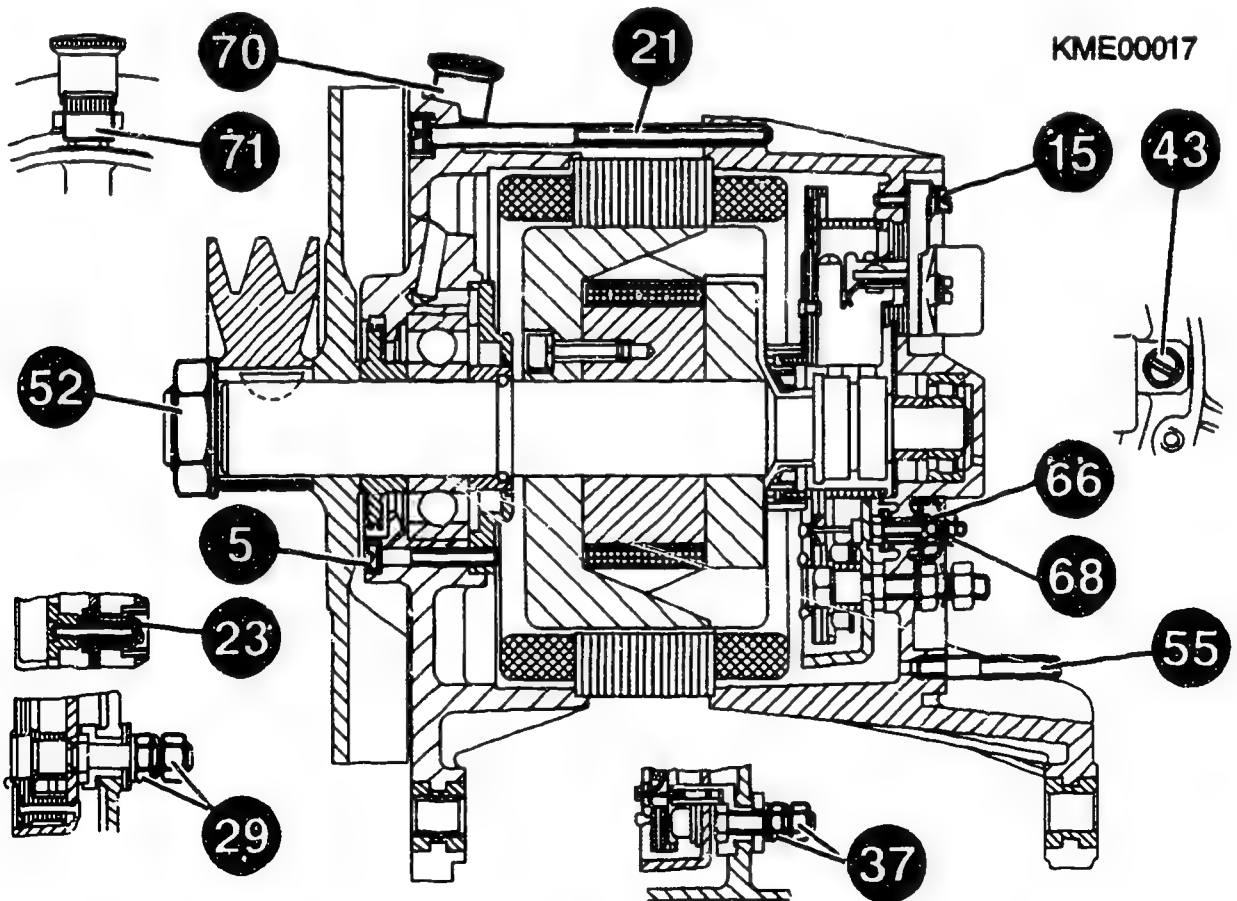
# TIGHTENING TORQUES

0 120 689 5 ..

Item 5, 66, 68	= 2.5... 3.3 Nm
Item 37 lower nut	= 4.1... 5.5 Nm
Item 21	= 6.4... 8.6 Nm
Item 43	= 4.0... 5.0 Nm
Item 23, 15	= 1.3... 1.7 Nm
Item 52	= 120... 150 Nm
Item 29 upper nut	= 3.0... 3.4 Nm
Item 55	= 3.0... 3.4 Nm
Item 29 lower nut	= 9.0... 13.0 Nm
Item 70	= 7.5... 10.0 Nm
Item 37 upper nut	= 1.3... 1.7 Nm
Item 71	= 4.5... 5.0 Nm

Continue: I21/1

Fig.: I20/2



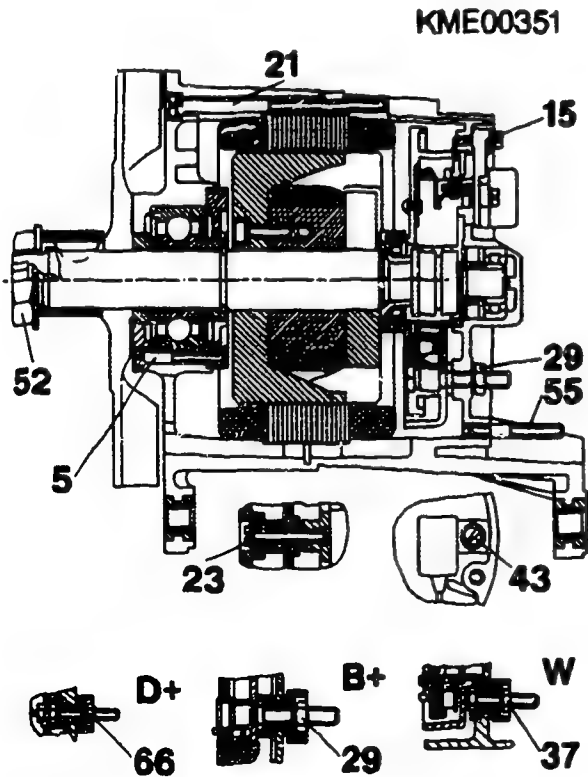
# TIGHTENING TORQUES

0 120 689 5 .. (long-life version)

Item 5, 37	= 4.1... 5.5 Nm
Item 15, 23	= 1.3... 1.7 Nm
Item 21	= 7.2... 9.7 Nm
Item 29	= 10....13.0 Nm
Item 43	= 4.3... 5.7 Nm
Item 52	= 135... 170 Nm
Item 55	= 3.0... 3.4 Nm
Item 66	= 2.4... 3.2 Nm

Continue: I22/1

Fig.: I21/2



# CIRCUIT DIAGRAM

Alternator T1 (RL) 28V 53/100A  
T1 (RL) 28V 58/105A

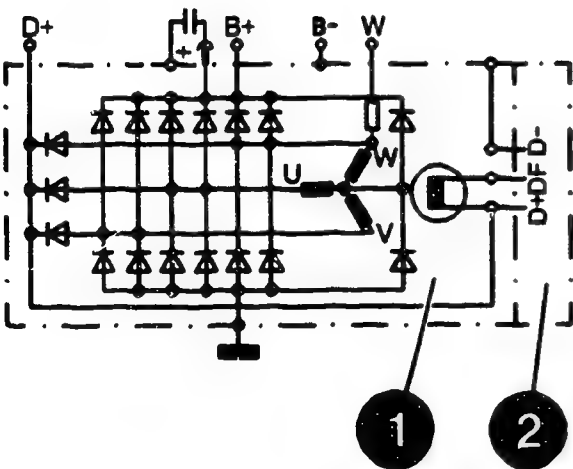
\* Negative to ground

1 = Alternator  
2 = Regulator

Continue: I23/1

Fig.: I22/2

KME00016



# CIRCUIT DIAGRAM

Alternator T1 (RL) 28V 53/100A  
T1 (RL) 28V 58/105A

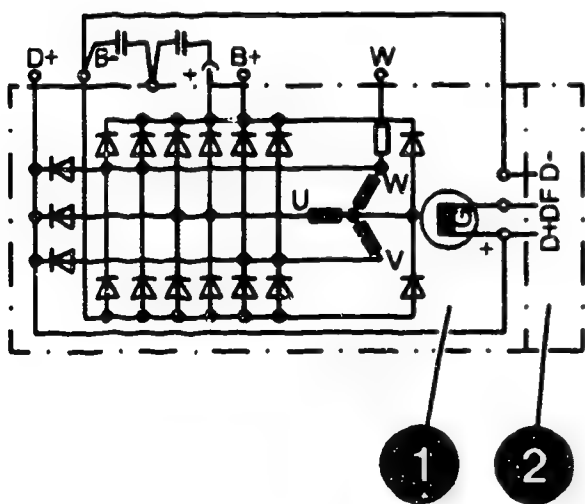
\* Both poles insulated

1 = Alternator  
2 = Regulator

Continue: I24/1

Fig.: I23/2

KME00381



# CIRCUIT DIAGRAM

Alternator T1 (RL) 28V 53/100A  
T1 (RL) 28V 58/105A

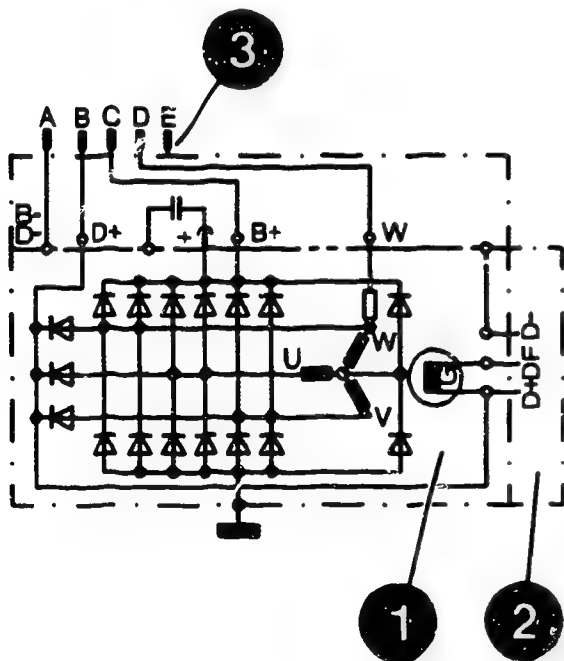
\* Negative to ground and unit socket

- 1 = Alternator
- 2 = Regulator
- 3 = Unit socket

Continue: I01/1

Fig.: I24/2

KME00382





# CIRCUIT DIAGRAM

Alternator T1 (RL) 28V 65/120A

T1 (RL) 28V 70/140A

\* Negative to ground

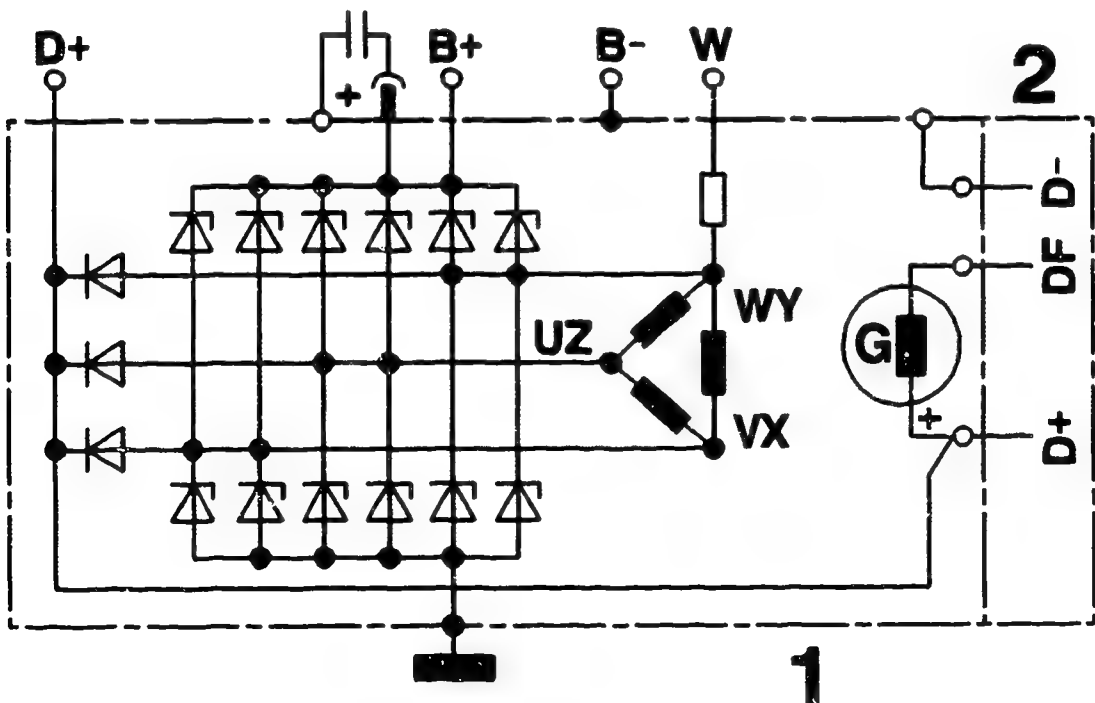
1 = Alternator

2 = Regulator

Continue: I26/1

Fig.: I25/2

KME00352



# CIRCUIT DIAGRAM

Alternator T1 (RL) 28V 65/120A

T1 (RL) 28V 70/140A

\* Both poles insulated

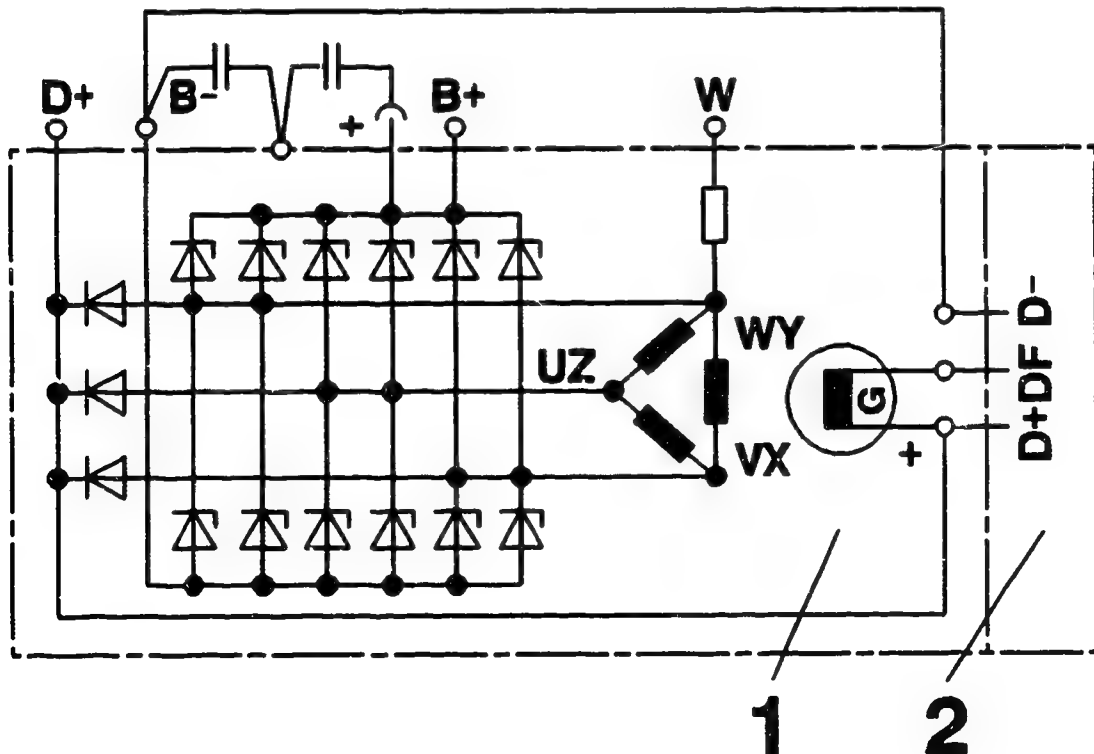
1 = Alternator

2 = Regulator

Continue: I01/1

Fig.: I26/2

KME00353



## ALTERNATOR DISASSEMBLY/TEST TABLE

Dismantling air-intake cover	I28/1
Removing regulator	II03/1
Checking regulator and carbon brushes	II04/1
Checking interference- suppression capacitor	II05/1
Removing fan and pulley	II07/1
Dismantling drive-end bearing	II09/1
Checking rectifier	II10/1
Checking stator	II12/1
Removing stator	II14/1
Checking rectifier	II15/1

Continue: I27/2

## ALTERNATOR DISASSEMBLY/TEST TABLE

Checking damping resistor	II16/1
Dismantling cylindrical roller bearing	II17/1
Checking slip bushing	II19/1
Dismantling claw-pole rotor	II21/1
Bearing disassembly	II22/1
Dismantling radial seal	II24/1
Checking rotor	II25/1
Measuring concentricity	II27/1
Pulling off cylindrical roller bearing inner race	III01/1
Pulling off collector rings	III03/1

Continue: I01/1

# DISMANTLING AND CHECKING ALTERNATOR

Dismantling air-intake cover:

Clamp alternator in clamping support.

T1 alternator, standard version:

Unscrew hexagon nuts (arrows)  
and remove air-intake cover.

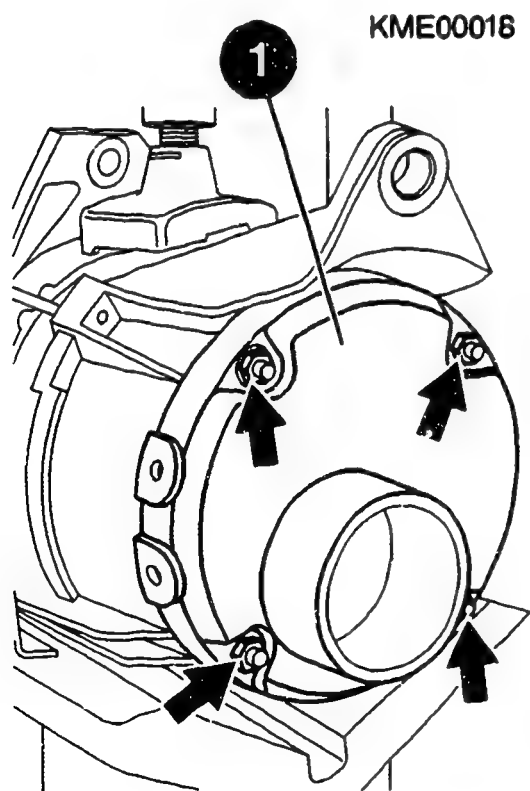
1 = Air-intake cover

Clamping support:

0 986 619 362

Continue: II01/1

Fig.: I28/2



## DISMANTLING AND CHECKING ALTERNATOR

T1 - Alternator with plug section:

Unscrew hexagon nuts (arrows) and detach air-intake cover with cooling-air connection and connector to the extent permitted by the length of the cable connections.

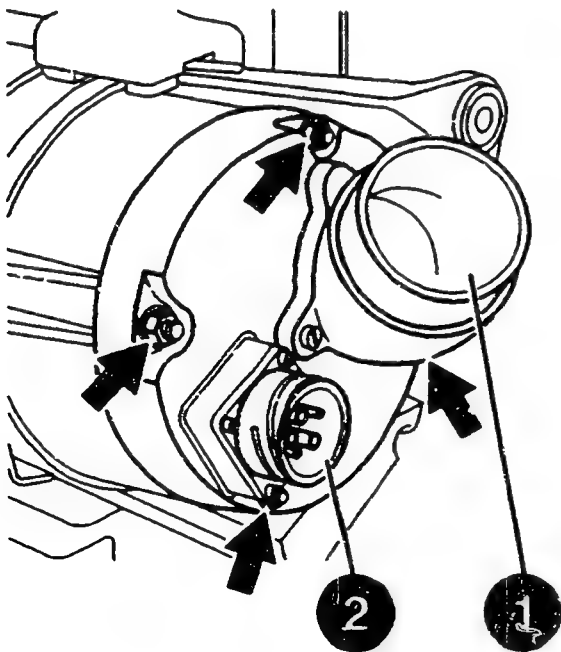
1 = Cooling-air connection

2 = Plug section with plug pins

Continue: II02/1

Fig.: II01/2

KME00019



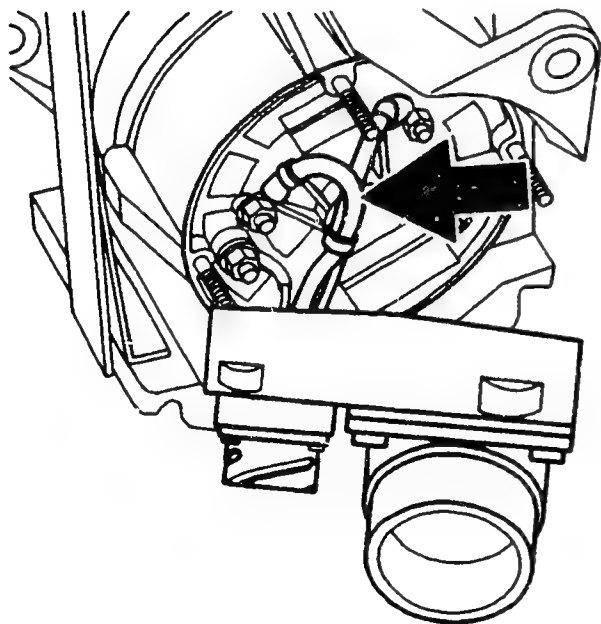
## DISMANTLING AND CHECKING ALTERNATOR

Unscrew cable connections on alternator end and remove entire air-intake cover.

Continue: I27/1

Fig.: I102/2

KME00020



# DISMANTLING AND CHECKING ALTERNATOR

## Removing regulator:

### N O T E:

Detach electronic regulator prior to further disassembly of alternator. This involves unfastening and removing regulator bolts.

Failure to adhere to this sequence will cause the carbon brushes to break when pulling the alternator apart.

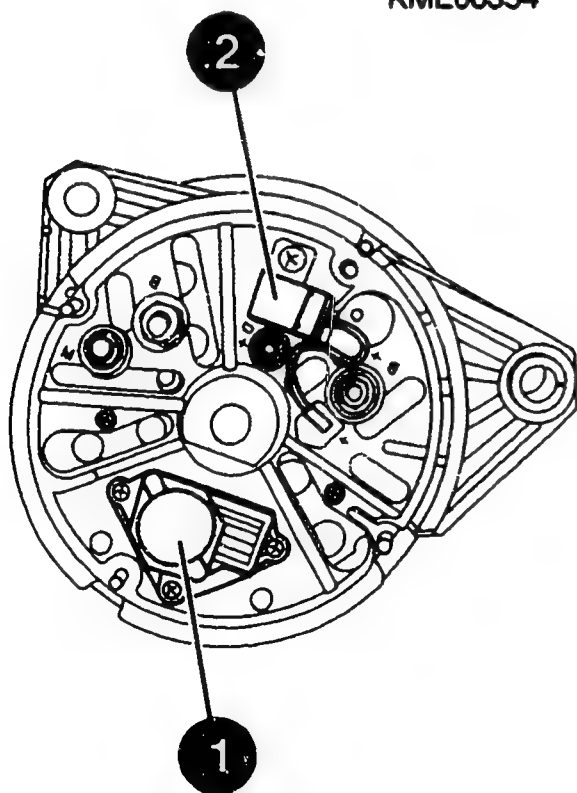
1 = Electronic regulator

2 = Capacitor

Continue: I27/1

Fig.: I103/2

KME00354



## DISMANTLING AND CHECKING ALTERNATOR

Checking regulator and carbon brushes:

Check regulator for external damage.

Replace regulator if carbon brushes have broken off or if projection "a" is less than 7 mm.

Carbon brush projection

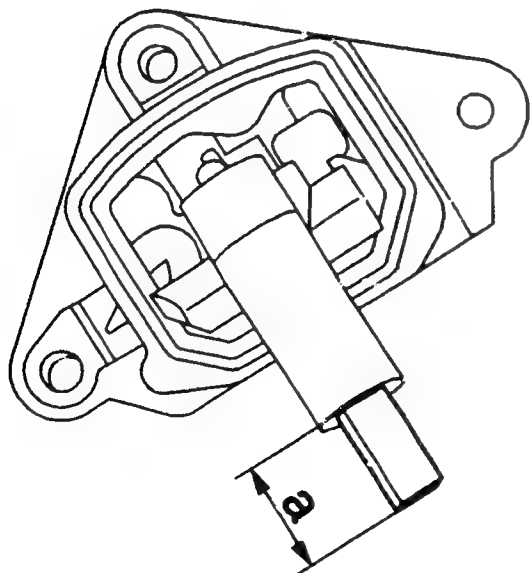
(new): > 16,0 mm

Min. carbon-brush projection: 7 mm

Continue: I27/1

Fig.: I104/2

KME00355





## DISMANTLING AND CHECKING ALTERNATOR

Checking interference-suppression capacitor:

Detach lead of interference-suppression capacitor from B+ plug connection.

Connect universal measuring instrument MMD 302 between lead of interference-suppression capacitor and terminal B- of alternator.

Set value: 1,8...2,6 microfarad

Renew defective interference-suppression capacitor if set value is not attained.

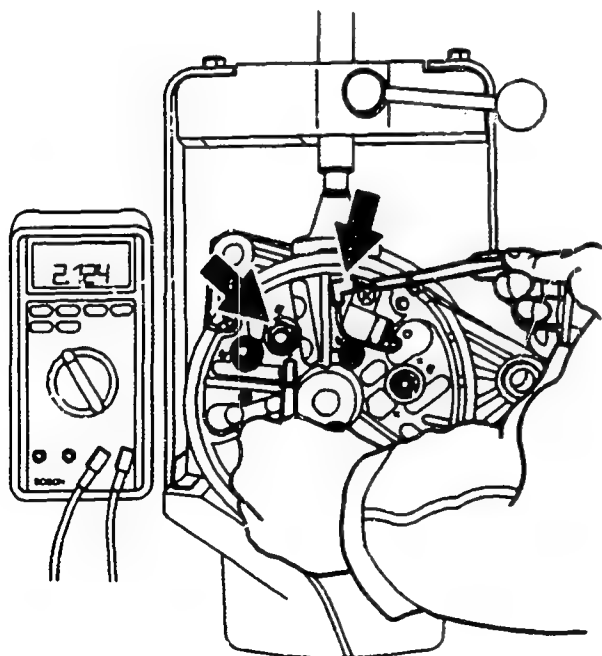
Universal measuring instrument MMD 302:

0 684 500 302

Continue: II06/1

Fig.: II05/2

KME00356



## **DISMANTLING AND CHECKING ALTERNATOR**

**Checking interference-suppression capacitor:**

### **A T T E N T I O N:**

**After checking, short-circuit interference-suppression capacitor and thus discharge it to ensure that cleaning fluid does not catch fire when cleaning components.**

**Continue: I27/1**

# DISMANTLING AND CHECKING ALTERNATOR

Removing fan and pulley:

Unfasten nut using clamping fixture and suitable open-ended wrench.

Remove pulley with fan.

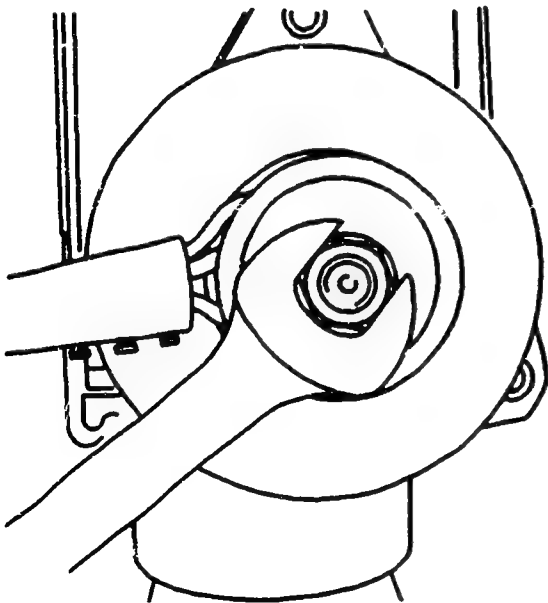
Two clamping fixtures can be used in the case of high unfastening torque.

Clamping fixture: 0 986 618 107

Continue: II08/1

Fig.: II07/2

KME00024



## DISMANTLING AND CHECKING ALTERNATOR

Removing fan and pulley:

(long-life version)

In the case of alternators with hexagon socket in rotor shaft, apply socket wrench to pulley nut.

Use commercially available hexagon-socket wrench to hold rotor shaft of alternator and unfasten nut with suitable open-ended wrench.

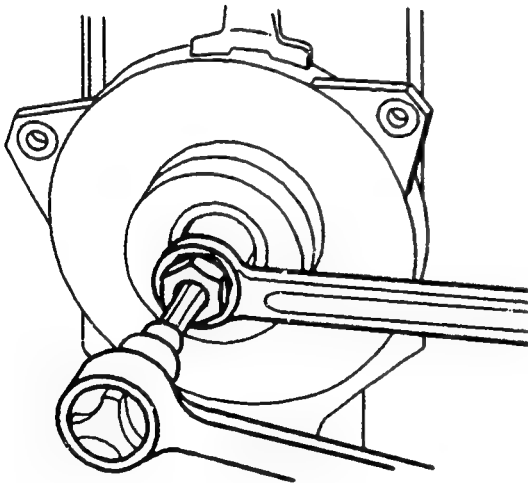
Socket wrench:

0 986 618 160

Continue: I27/1

Fig.: II08/2

KME00006



## DISMANTLING AND CHECKING ALTERNATOR

### Dismantling drive-end bearing:

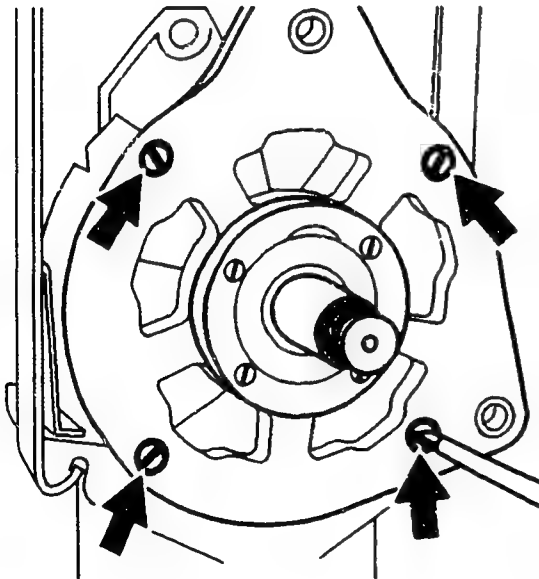
#### N O T E:

Prior to further disassembly of alternator, mark drive-end bearing, collector-ring end shield and stator to ensure that they are installed in the same position on assembly. Unfasten and remove bolts (arrows). Pull drive-end bearing with rotor out of collector-ring end shield.

Continue: I27/1

Fig.: II09/2

KME00025



## DISMANTLING AND CHECKING ALTERNATOR

### Checking rectifier:

Use alternator tester to check function of wired-up rectifier.

Capacitor not connected.

Note switch positions on alternator tester.

Measurement points:

Housing and ends of windings

B+ and soldered joint, stator connections

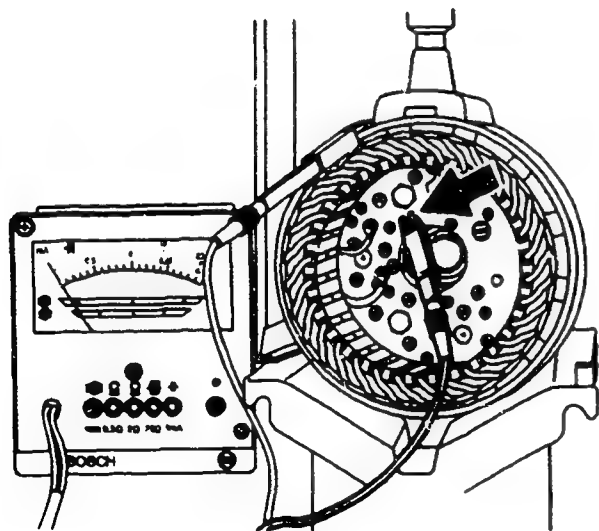
D+ and soldered joint, stator connections

Alternator tester: 0 684 201 200

Continue: I111/1

Fig.: I110/2

KME00357



## DISMANTLING AND CHECKING ALTERNATOR

### Checking rectifier:

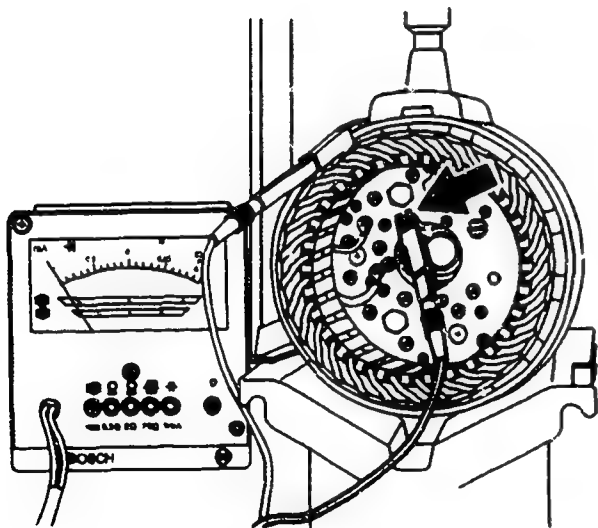
Rectifier is OK if pointer of alternator tester is in green range.

Renew entire rectifier if one or more diode(s) is/are defective.

Continue: I27/1

Fig.: I111/2

KME00357



## DISMANTLING AND CHECKING ALTERNATOR

Checking stator:  
(resistance)

Use alternator tester to check  
resistance of installed stator.  
Note switch position on tester.

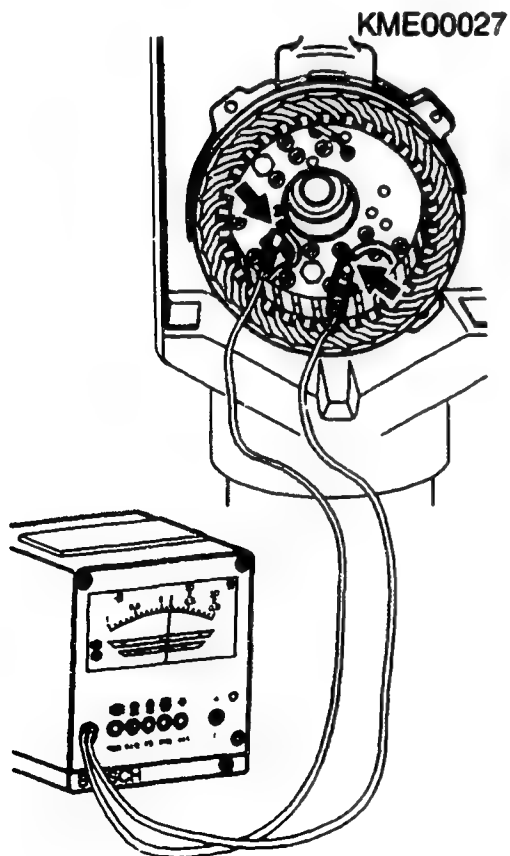
Resistances in ohms 2).

T1 (RL)	28V 53/100A	:	0,071	Ohm	+	10	%
T1 (RL)	28V 58/105A	:	0,071	Ohm	+	10	%
T1 (RL)	28V 65/120A	:	0,047	Ohm	+	10	%
T1 (RL)	28V 70/140A	:	0,036	Ohm	+	10	%

2) Between phase outputs

Continue: II13/1

Fig.: II12/2





## DISMANTLING AND CHECKING ALTERNATOR

Checking stator:  
(short to ground)

Use test prods to check installed stator for short to ground.

Test voltage: 80 V AC

A T T E N T I O N:

Voltages of 80 V can prove fatal.

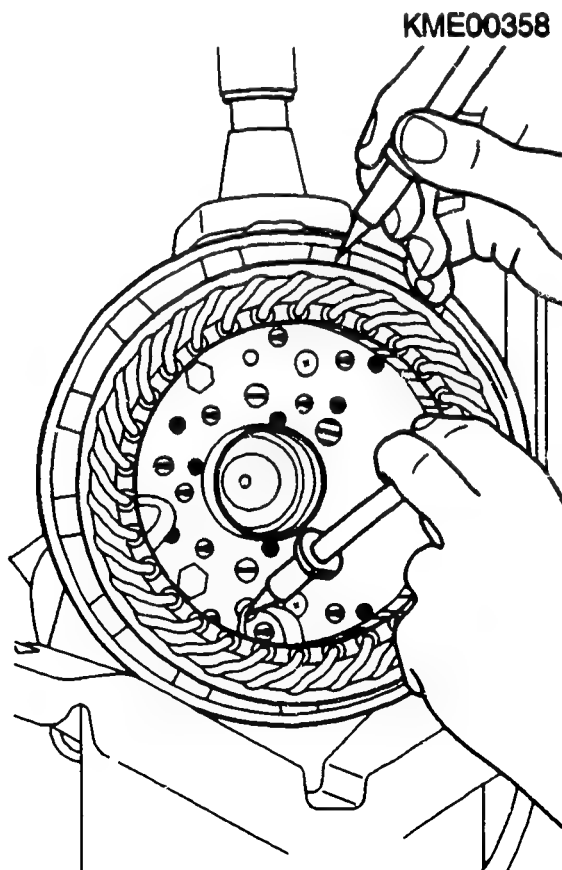
When performing this test, proper handling of the stator and all parts coming into electrical contact with it must be ensured.

Test prods:

0 986 619 101

Continue: I27/1

Fig.: II13/2



## DISMANTLING AND CHECKING ALTERNATOR

### Removing stator:

Remove tin solder from phase connections at rectifier using soldering iron or gun. Use screwdriver or pliers to bend open wiring connections and pull wires out of eyelets.

Continue: I27/1

## DISMANTLING AND CHECKING ALTERNATOR

### Removing rectifier:

Unfasten bolts (arrows) on inside of rectifier and remove. Unsolder terminal W. Unfasten terminal studs B+, B- and D+ on outside of collector-ring end shield (terminal studs are permanently attached to rectifier).

### N O T E:

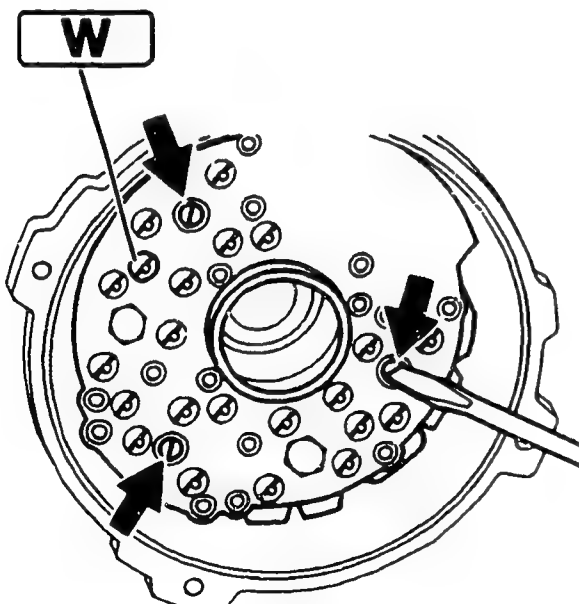
Do not unfasten terminal W here.

Remove rectifier.

Continue: I27/1

Fig.: I115/2

KME00029



## DISMANTLING AND CHECKING ALTERNATOR

Checking damping resistor:

Damping resistor is potted in housing of terminal stud W

Connect up universal measuring instrument MMD 302 as shown in Fig. Replace defective resistor.

Resistance: 3,1...3,5 kOhm

Versions:

0 120 689 532: 1 kOhm

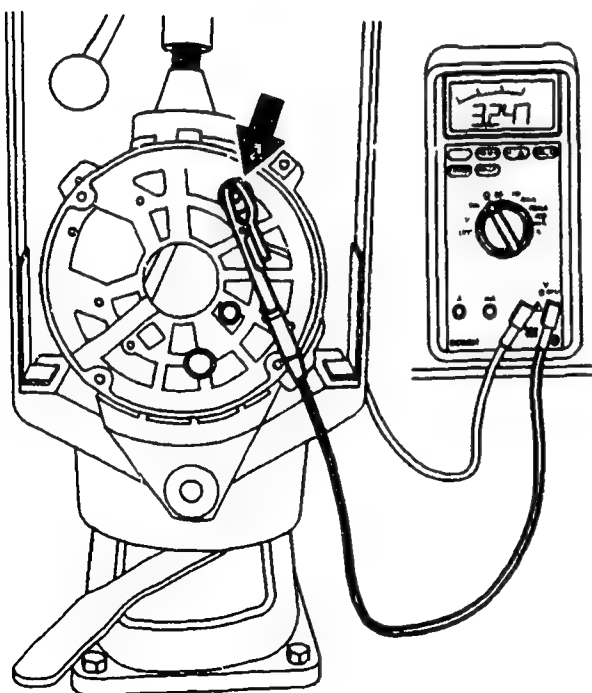
0 120 689 566: 1 kOhm

Universal measuring instrument MMD 302 0 684 500 302

Continue: I27/2

Fig.: II16/2

KME00359



## DISMANTLING AND CHECKING ALTERNATOR

### Dismantling cylindrical roller bearing:

#### Removing cylindrical roller bearing with radial seal:

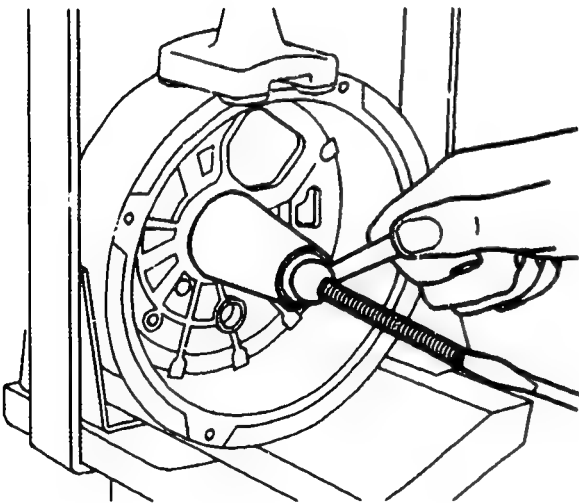
Insert extractor into cylindrical roller bearing. Screw threaded pin to extractor as extension. Apply puller. Screw on tommy bar and pull out cylindrical roller bearing with radial seal.

Extractor:	0 986 618 121
Puller:	0 986 618 214
Threaded pin from tool board:	0 986 619 250

Continue: II18/1

Fig.: II17/2

KME00383



## DISMANTLING AND CHECKING ALTERNATOR

Removing cylindrical roller bearing with radial seal:

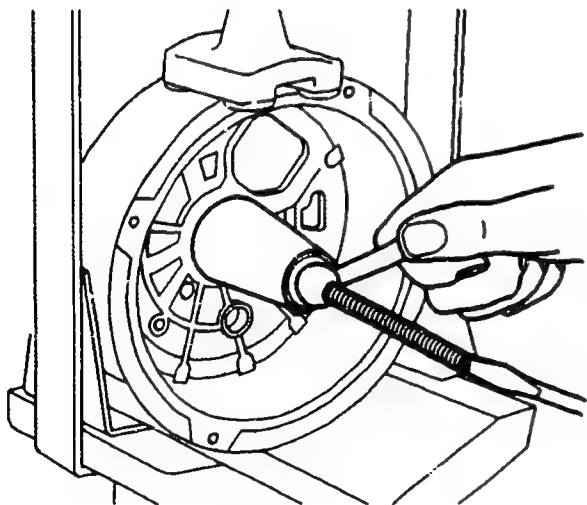
If cylindrical roller bearing cannot be pulled out, use screwdriver for example to destroy bearing cage and remove rollers. Use spring collet to remove remainder of cylindrical roller bearing.

Spring collet: 0 986 619 233

Continue: I27/2

Fig.: I118/2

KME00383



# DISMANTLING AND CHECKING ALTERNATOR

Checking slip bushing:

Improving sliding action of slip bushing

On alternators with slip bushing (arrow), use appropriate mandrel to press out bushing and apply Molycote paste to hole.

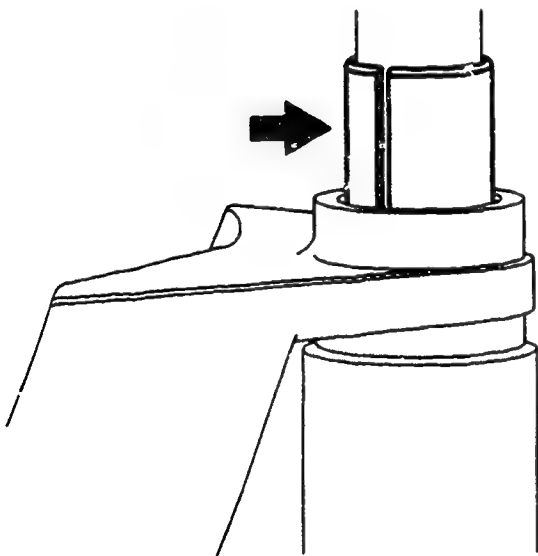
Pressing-out mandrel: 0 986 618 129

Ft 70 v 1: 5 700 040 000

Continue: II20/1

Fig.: II19/2

KME00032



## DISMANTLING AND CHECKING ALTERNATOR

### Checking slip bushing:

Then use pressing-out mandrel to press in slip bushing until bushing is flush with inside edge of boss of collector-ring end shield. Use support and backing mandrel as a rest.

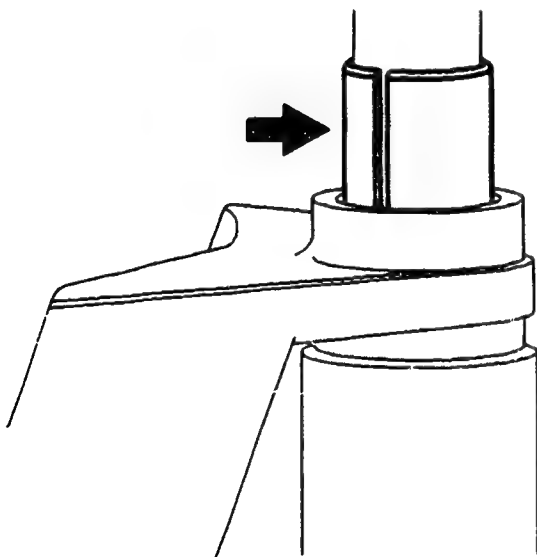
Pressing-out mandrel: 0 986 618 129

Support and backing mandrel: 0 986 618 130

Continue: I27/2

Fig.: I120/2

KME00032





## DISMANTLING AND CHECKING ALTERNATOR

### Dismantling claw-pole rotor:

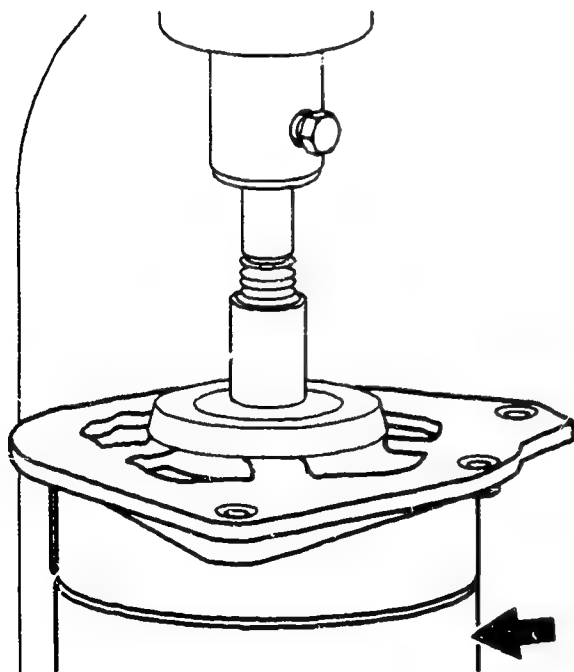
#### N O T E:

Claw-pole rotor only has to be pressed out if the collector-ring end shield or excitation winding is defective or spacer ring worn (race in drive-end bearing). Position drive-end bearing on pressing-out ring (arrow). Use mandrel press and suitable mandrel to press out claw-pole rotor.  
Pressing-out ring: 0 986 613 127

Continue: I27/2

Fig.: I121/2

KME00384



## DISMANTLING AND CHECKING ALTERNATOR

### Bearing disassembly:

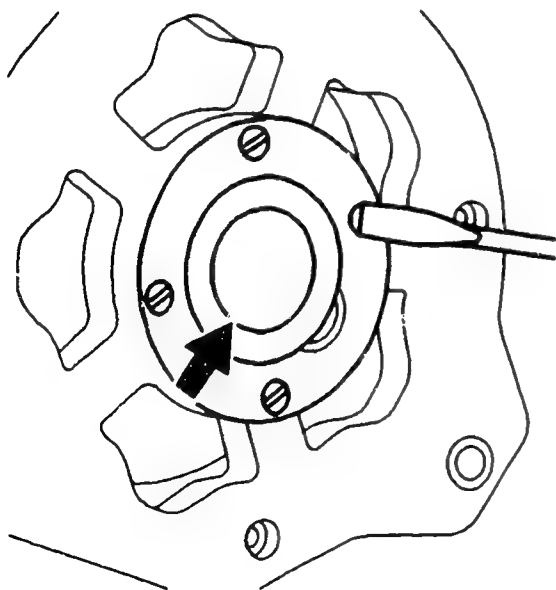
#### N O T E:

Always replace deep-groove ball bearing after pressing out rotor. Unfasten and remove bolts. Grease regulator (arrow) can be detached after pressing out rotor. Remove cover plate with pressed-in radial seal on inside of drive-end bearing (not with long-life version). Remove deep-groove ball bearing by hand (sliding fit).

Continue: II23/1

Fig.: II22/2

KME00034



## DISMANTLING AND CHECKING ALTERNATOR

**Bearing disassembly:  
(ball bearing press fit)**

Heat drive-end shield to approx. 90C  
in oil bath or on hot plate.

Position drive-end shield on pressing-  
out ring and carefully press out ball  
bearing under mandrel press using  
appropriate mandrel (not illustrated).

Pressing-out mandrel:	0 986 618 139
Pressing-out ring for rotor:	0 966 618 127

**Continue: I27/2**

## DISMANTLING AND CHECKING ALTERNATOR

Dismantling radial seal:

Clamp cover plate in vice.

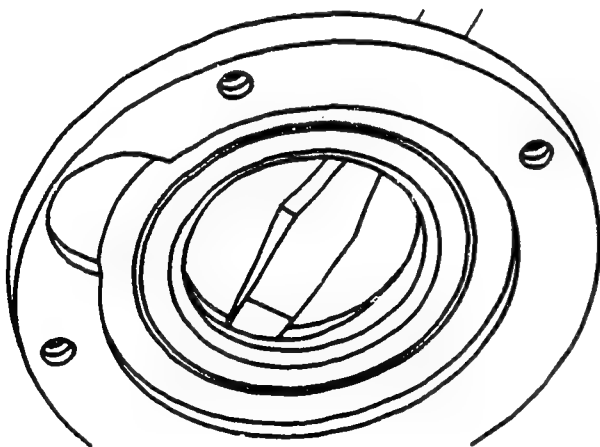
Use screwdriver to press radial seal out of cover plate.

Long-life alternators have no radial seal.

Continue: I27/2

Fig.: I124/2

KME00035



## DISMANTLING AND CHECKING ALTERNATOR

Checking rotor:  
(resistance)

Use alternator tester or universal measuring instrument MMD 302 to measure rotor resistance.

Resistance values:

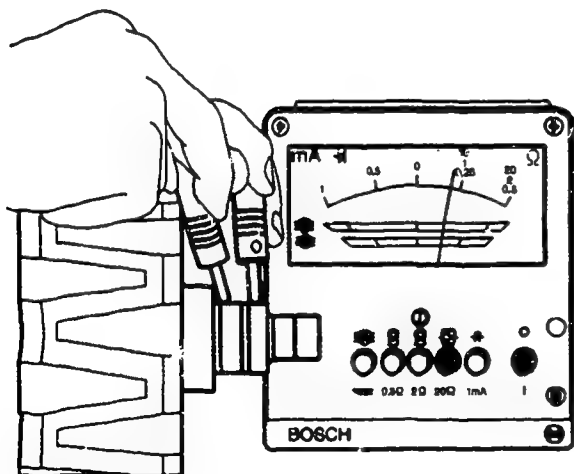
T1 (RL)	28V 53/100A	: 8,5...9,4 Ohm
T1 (RL)	28V 58/105A	: 8,5...9,4 Ohm
T1 (RL)	28V 65/120A	: 7,5...8,3 Ohm
T1 (RL)	28V 70/140A	: 7,5...8,3 Ohm

Alternator tester:	0 684 201 200
Universal measuring instrument MMD 302:	0 684 500 302

Continue: II26/1

Fig.: II25/2

KME00360



# DISMANTLING AND CHECKING ALTERNATOR

Checking rotor:  
(short to ground)

Use interturn short-circuit tester and test prods to check rotor for short to ground

Test voltage: 80 V AC

Interturn short-circuit  
tester:

0 986 619 110

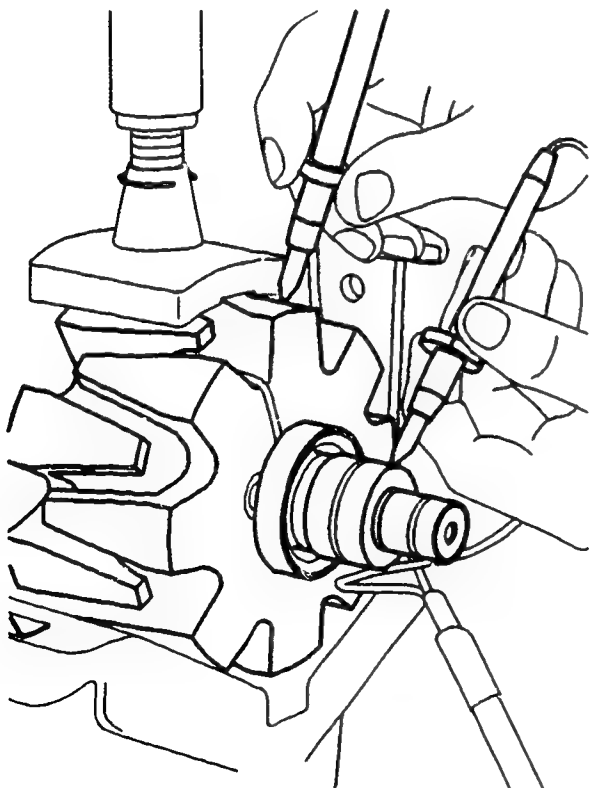
Test prods:

0 986 619 101

Continue: I27/2

Fig.: II26/2

KME00361



# DISMANTLING AND CHECKING ALTERNATOR

## Measuring concentricity:

Clamp rotor at mounting points in V-blocks and align so as to be exactly horizontal. Perform concentricity measurement at OD of rotor and OD of collector rings (arrow) using magnetic measurement stand and dial indicator.

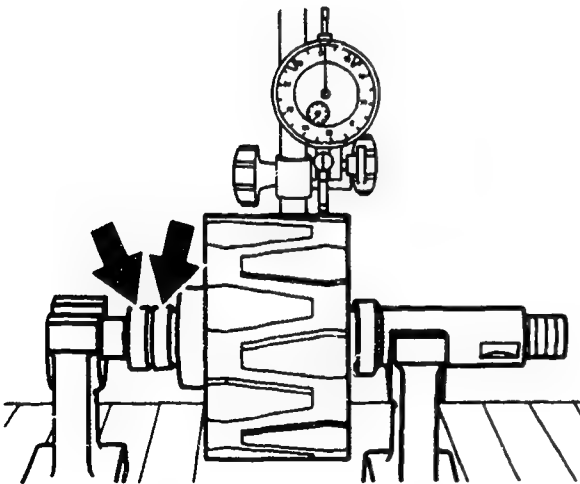
Dial indicator: 1 687 233 011

Magnetic measurement stand: 4 851 601 124

Continue: II28/1

Fig.: II27/2

KME00038



# DISMANTLING AND CHECKING ALTERNATOR

Measuring concentricity:

Max. deviation at rotor: 0,05 mm

Max. deviation at collector rings: 0,03 mm

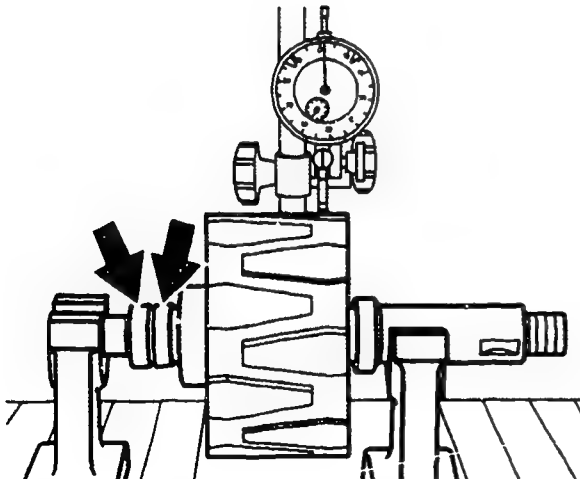
Turn down collector rings in the event of greater deviation.

Min. diameter of collector rings: 31,5 mm

Continue: I27/2

Fig.: I128/2

KME00038





## DISMANTLING AND CHECKING ALTERNATOR

Pulling off cylindrical roller bearing inner race:

Clamp rotor in clamping support.  
Use puller to pull off cylindrical roller bearing inner race.

Deatch (press or sliding fit) spacer ring (arrow).

Always replace inner race if cylindrical roller bearing is replaced.

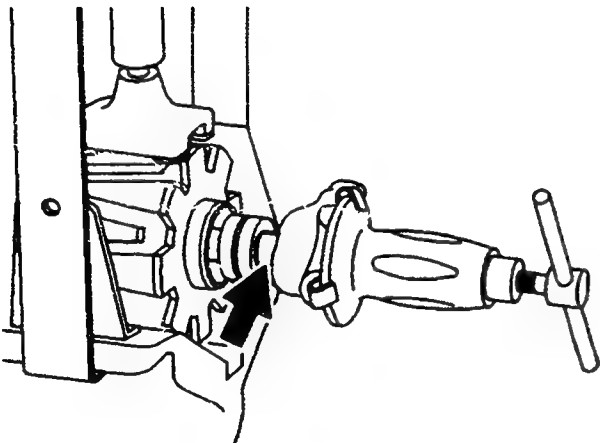
Puller: 0 986 619 269

Clamping support: 0 986 619 362

Continue: III02/1

Fig.: III01/2

KME00039



## DISMANTLING AND CHECKING ALTERNATOR

Pulling off cylindrical roller bearing inner race:  
(long-life version)

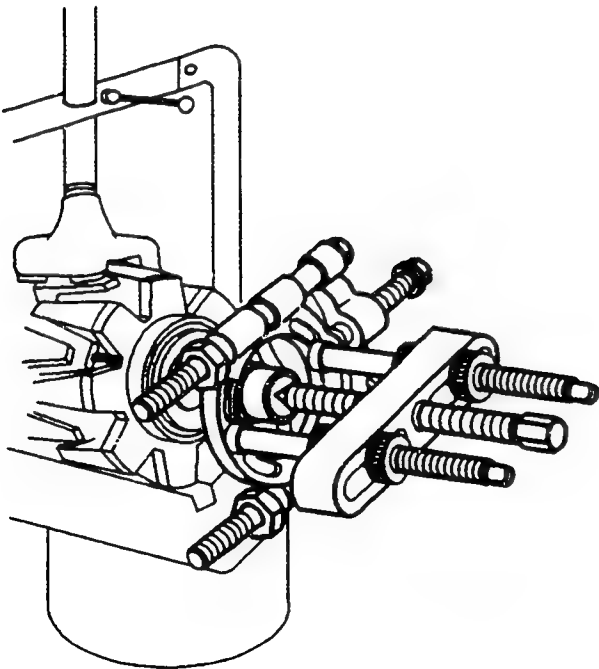
Use commercially available puller to pull off cylindrical roller bearing inner race.

Always replace inner race if cylindrical roller bearing is replaced.

Continue: I27/2

Fig.: III02/2

KME00139



## DISMANTLING AND CHECKING ALTERNATOR

### Pulling off collector rings:

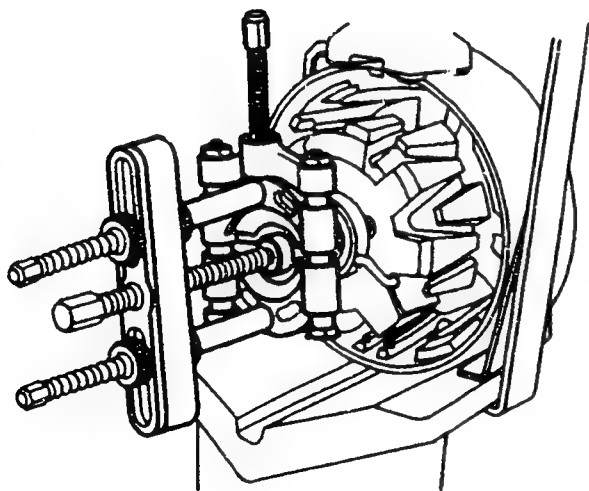
On long-life version, spacer ring must be pulled off (press fit) beforehand using commercially available puller.

Unsolder excitation winding wire from collector rings and use commercially available puller to pull collector rings off rotor shaft.

Continue: I27/2

Fig.: III03/2

KME00007



## COMPONENT CLEANING

### A T T E N T I O N : F I R E R I S K

For interference suppression, alternators are fitted with capacitors with a long storage time.

When washing out components, capacitor discharge may occur on immersing components in cleaning fluids, thus possibly causing inflammable liquids to catch fire.

Continue: III04/2

### SAFETY MEASURES

For this reason, components with capacitors are only to be washed out in HAKU 1025/6.

Continue: I01/1

## ALTERNATOR ASSEMBLY TABLE

Pressing on collector rings	III06/1
Pressing on spacer ring	III07/1
Renewing radial seal	III08/1
Assembling drive-end bearing	III09/1
Pressing rotor into drive-end bearing	III12/1

Continue: III05/2

## ALTERNATOR ASSEMBLY TABLE

Assembling collector-ring end shield	III14/1
Installing rectifier	III17/1
Installing stator and rotor	III20/1
Installing regulator	III24/1
Attaching capacitor	III26/1
Attaching air-intake cover	III27/1

Continue: I01/1

## ASSEMBLING ALTERNATOR

Pressing on collector rings:

Position rotor on mandrel press.  
Attach collector rings to rotor shaft  
and press home using pressing-in  
tool.

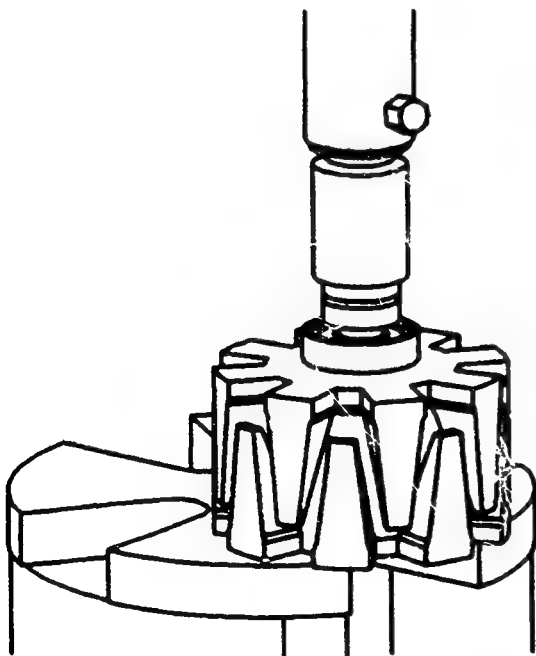
Solder on wire of excitation winding.  
Dress soldered joint at both collector  
rings such that rings no longer  
exhibit any unevenness.

Pressing-on mandrel: 0 986 618 134

Continue: III05/1

Fig.: III06/2

KME00362



# ASSEMBLING ALTERNATOR

Pressing on spacer ring:

Use pressing-on tool to press home spacer ring.

**A T T E N T I O N:**

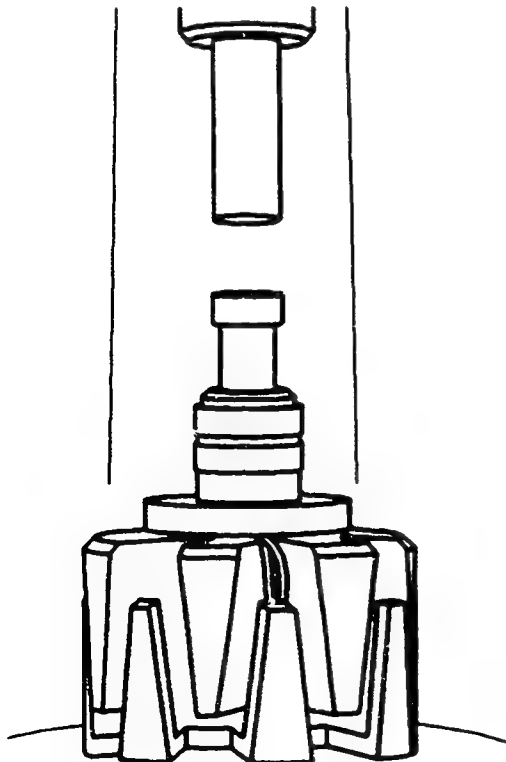
Take care not to tilt spacer ring when pressing it on.

Pressing-on mandrel: 0 986 618 134

Continue: III05/1

Fig.: III07/2

KME00008



# ASSEMBLING ALTERNATOR

Renewing radial seal:  
(long-life version has no  
radial seal)

Press home radial seal in cover plate  
using pressing-in tool and fill with  
grease.

Prescribed quantity of grease 4g

**N O T E:**

Open side of radial seal faces  
pressing-in tool.

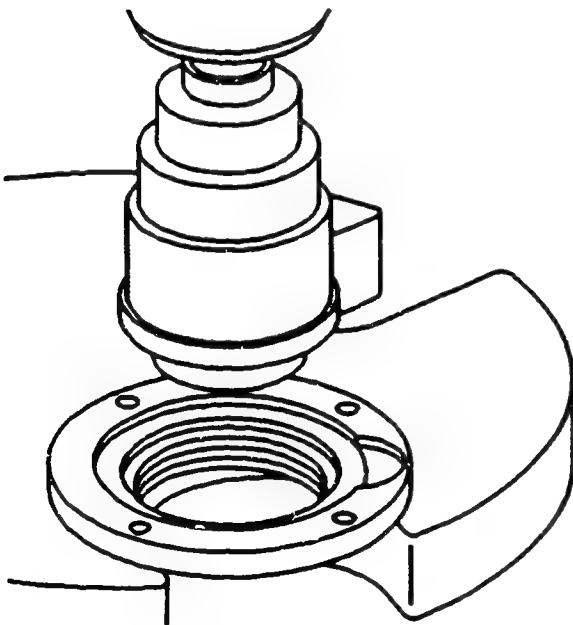
Pressing-in tool: 0 986 618 152

Ft1 v 34: 5 700 009 000

Continue: III05/1

Fig.: III08/2

KME00041





## ASSEMBLING ALTERNATOR

### Assembling drive-end bearing:

Fill deep-groove ball bearing with 9..10g of grease and insert in drive-end bearing.

Mount cover plate with radial seal on inside of drive-end bearing (long-life version has no radial seal). Make sure that recess in cover plate is over grease outlet hole (arrow). Screw on cover plate from outside.

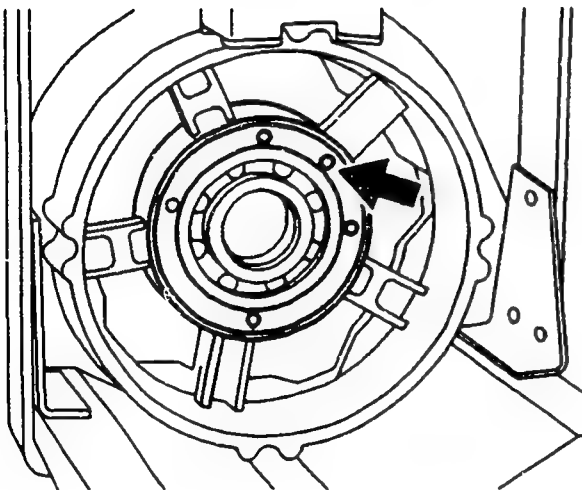
Tightening torque:  
Ft1 v 34:

4.1..5.5 Nm  
5 700 009 000

Continue: III10/1

Fig.: III09/2

KME00042



## ASSEMBLING ALTERNATOR

Assembling drive-end bearing:  
(long-life version)

Insert closed deep-groove ball  
bearing in drive-end bearing.  
Screw on cover plate from outside.

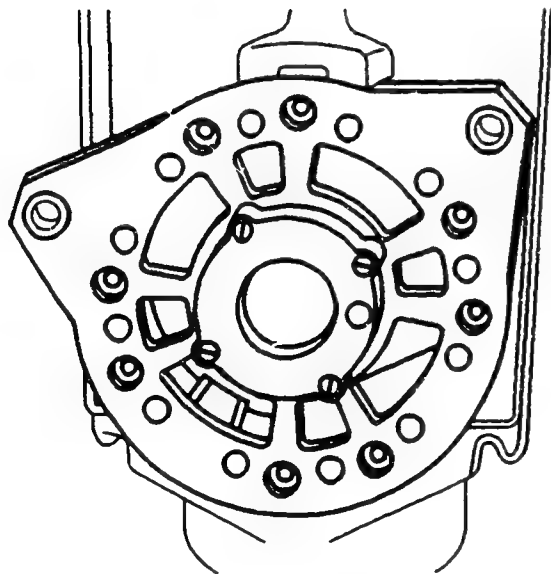
Tightening torque: 4.1..5.5 Nm

**A T T E N T I O N :**  
Pay attention to correct assembly  
position of cover plate as per  
sectional view in Tightening Torques  
Section.

Continue: III11/1

Fig.: III10/2

KME00009



## ASSEMBLING ALTERNATOR

Assembling drive-end bearing:

(ball bearing press fit)

Heat drive-end shield to approx. 90C  
in oil bath or on hot plate.

Position drive-end bearing on mandrel  
press. Place ball bearing on hub and  
press in carefully using suitable  
mandrel. Make sure ball bearing does  
not tilt (not illustrated).

**N O T E:**

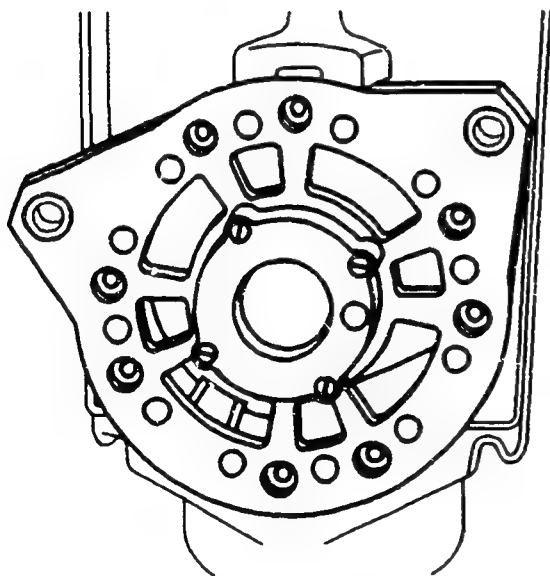
Only press in ball bearing at outer  
race.

Pressing-in mandrel: to be improvised

Continue: III05/1

Fig.: III11/2

KME00009



## ASSEMBLING ALTERNATOR

Pressing rotor into drive-end bearing:

Place drive-end bearing on mandrel press.

Use suitable mandrel to press support ring (item 2) onto drive end of rotor shaft and spacer ring (item 1) onto collector-ring end.

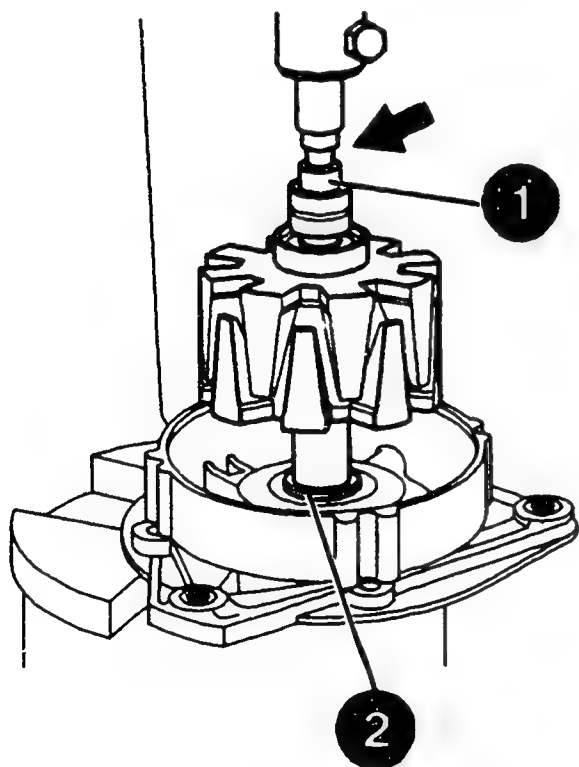
**A T T E N T I O N:**

Take care not to tilt spacer ring when pressing it on.

Continue: III13/1

Fig.: III12/2

KME00043



## ASSEMBLING ALTERNATOR

Pressing rotor into drive-end bearing:

Insert new spacer ring in drive-end bearing on far end, with narrow collar facing deep-groove ball bearing. Insert rotor in deep-groove ball bearing. Mount cylindrical roller bearing inner race (arrow) on rotor shaft on collector-ring end. Use pressing-on mandrel to press home cylindrical roller bearing inner race and rotor in drive-end bearing.

**N O T E:**

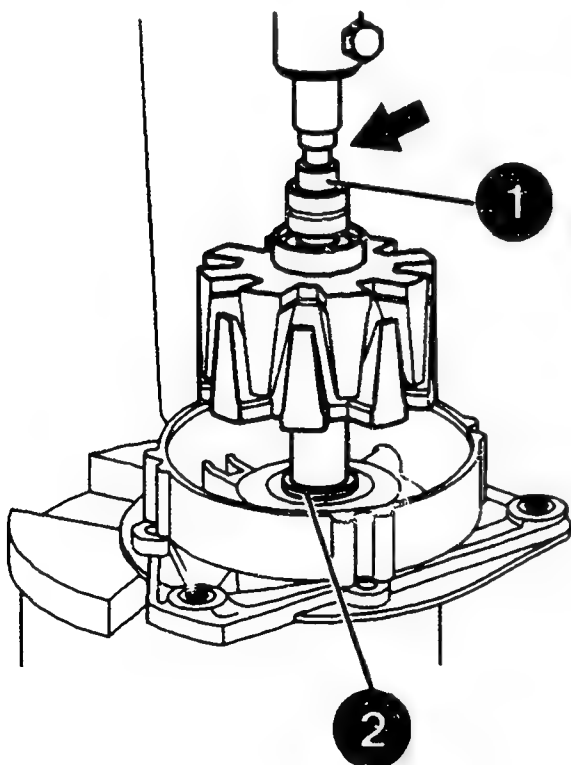
Alternator 0 120 689 562: Sliding fit between ball bearing and rotor shaft.

Pressing-on mandrel: 0 986 618 134

Continue: III05/1

Fig.: III13/2

KME00043



## ASSEMBLING ALTERNATOR

### Assembling collector-ring end shield:

Use pressing-in tool to press home cylindrical roller bearing in collector-ring end shield. Then fill relief hole with grease from inside of hub to prevent ingress of dirt or water.

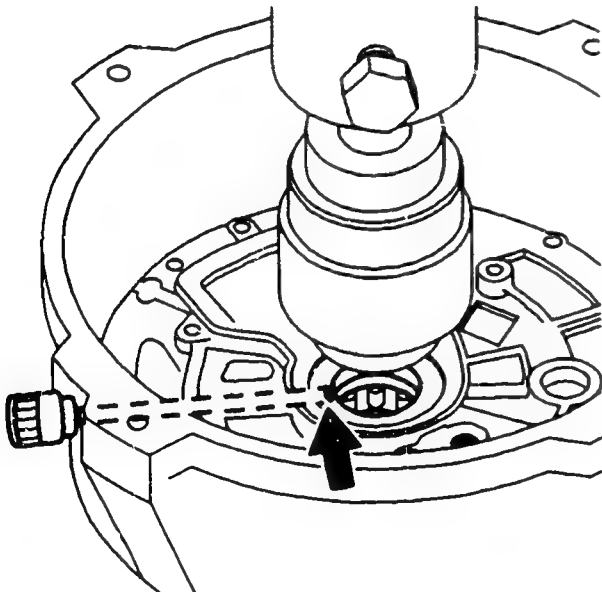
Quantity of grease for cylindrical roller bearing/  
relubrication version: 3g

Pressing-in tool:	0 986 618 125
Ft1 v 34:	5 700 009 000

Continue: III15/1

Fig.: III14/2

KME00140



## ASSEMBLING ALTERNATOR

### Assembling collector-ring end shield:

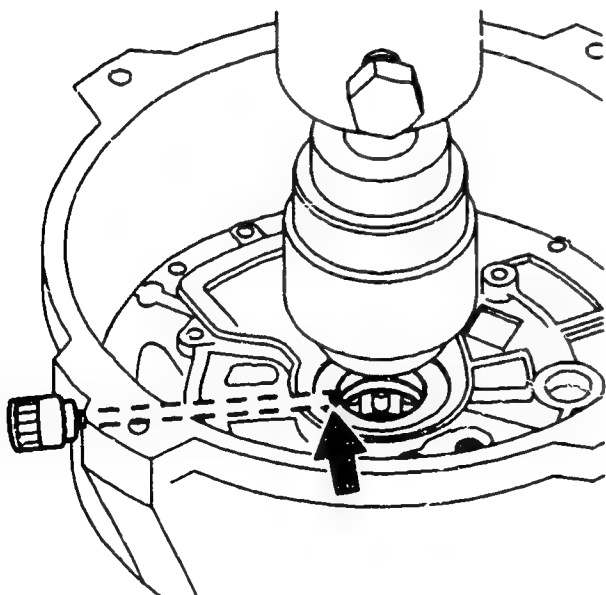
Use radial-seal pressing-in tool to press radial seal into collector-ring end shield such that it is flat, i.e. such that grease outlet hole (arrow) marked with a broken line is not covered by radial seal (applies only to relubrication version).

Pressing-in tool: 0 986 618 125

Continue: III16/1

Fig.: III15/2

KME00140



## ASSEMBLING ALTERNATOR

Assembling collector-ring end shield:

Quantity of grease for cylindrical  
roller bearing: 2...2.5 g

Fill base of bearing with approx. 2g  
of grease.

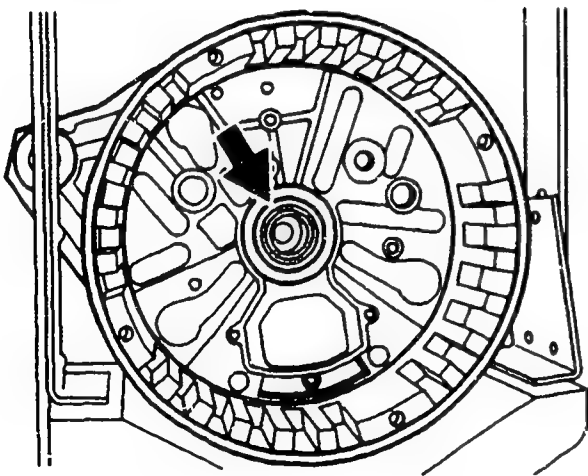
Lip (arrow) of radial seal greased  
without accumulation of grease on  
collector-ring end.

VS 15164-Ft: 5 975 560 000

Continue: III05/2

Fig.: III16/2

KME00010





# ASSEMBLING ALTERNATOR

## Installing rectifier:

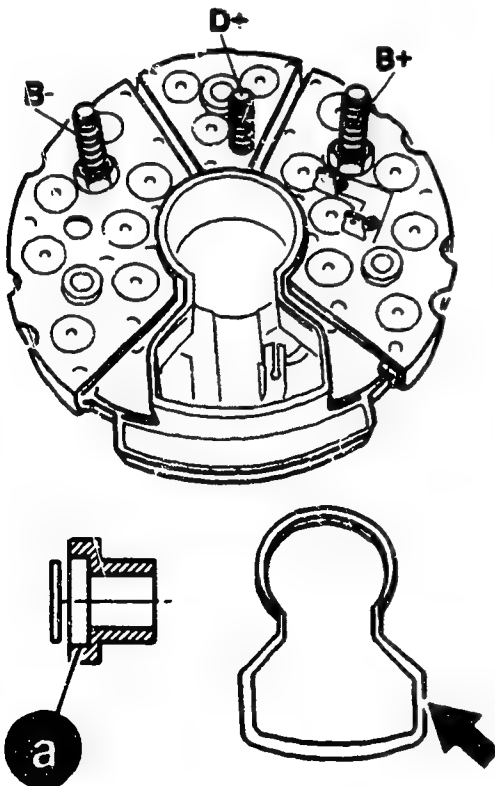
Place seal (arrow) on key hole of rectifier and bond on all round.

Place insulating part (a) and shim over B+ and D+ (over B- stud as well if both poles of alternator are insulated).  
Insert rectifier into collector-ring end shield.

Continue: III18/1

Fig.: III17/2

KME00011



# ASSEMBLING ALTERNATOR

## Installing rectifier:

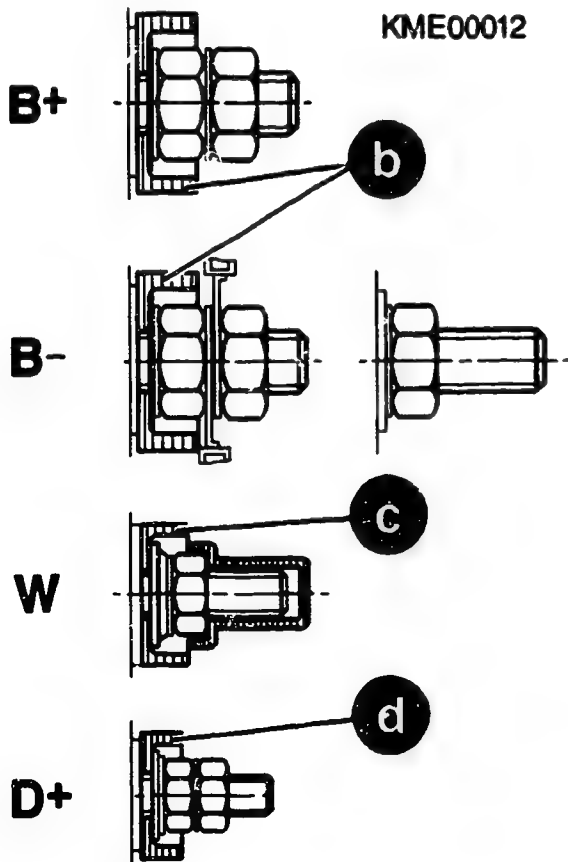
Attach insulating parts (b, c and d) to studs B+, W and D+ (also attach insulating part (b) to B- in the case of alternator with both poles insulated).

## Tightening torques:

B+	= Both nuts	10...13 Nm
B-	= Both nuts	10...13 Nm
D+	= Both nuts	2,4...3,2 Nm
W	= Nut	4,1...5,5 Nm

Continue: III19/1

Fig.: III18/2



# ASSEMBLING ALTERNATOR

## Installing rectifier:

Use bolts (arrow) - depending on alternator version - to screw on rectifier on alternator end.

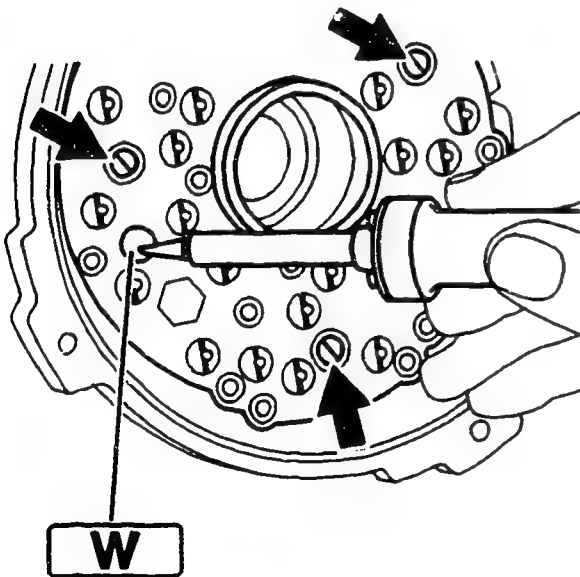
Tightening torque: 1,3...1,7 Nm

Solder connection W back on again.

Continue: III05/2

Fig.: III19/2

KME00045



## ASSEMBLING ALTERNATOR

### Installing stator and rotor:

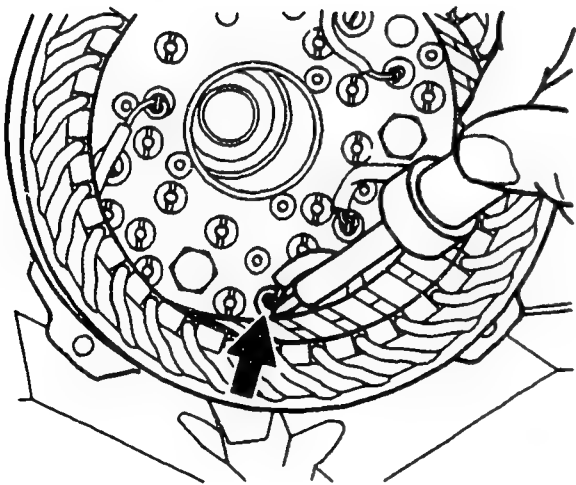
Position stator at rectifier mount. Align marks made on collector-ring end shield and stator before dismantling alternator. Solder on stator wires.

Completely cover soldered connections (wire and loop) with silicone. Make sure wires do not then catch on rotor.

Continue: III21/1

Fig.: III20/2

KME00046



## **ASSEMBLING ALTERNATOR**

**Installing stator and rotor:**

### **A T T E N T I O N:**

**Remove adhesive label on outside of bottom of bearing end plate.**

**Carefully insert rotor with drive-end bearing taking care not to alter position of roller bearing and radial seal.**

**Continue: III22/1**

## ASSEMBLING ALTERNATOR

### Installing stator and rotor:

The following operations are required to ensure proper rotor concentricity and alignment of the drive-end bearing:

Insert four feeler gauges (1) between stator and rotor.

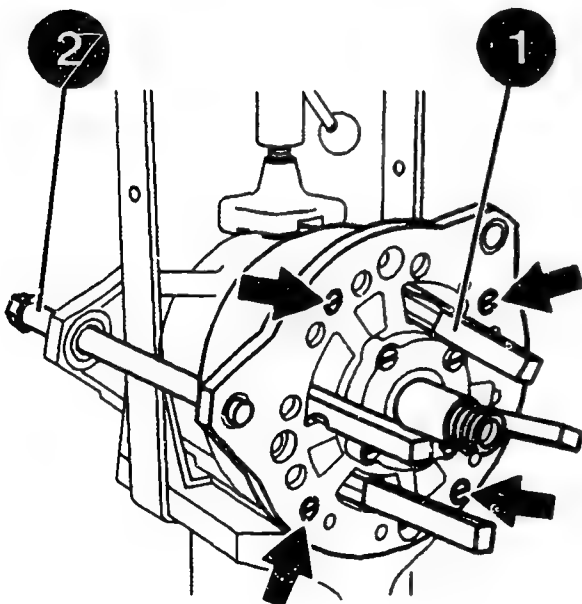
Leaf thickness: 0.3 mm

Feeler gauges: 0 986 618 378

Continue: III23/1

Fig.: III22/2

KME00047



# ASSEMBLING ALTERNATOR

## Installing stator and rotor:

Use pin (2) as gauge to ensure alignment of swivel arm and drive-end bearing.

It must be easy to screw in pin by hand.

Tighten bolts (arrows).

Tightening torque: 7,2...9,7 Nm

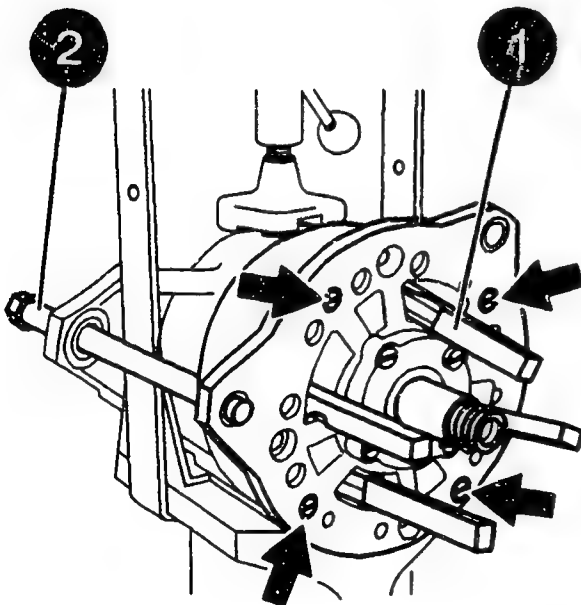
1 = Feeler gauge 0 986 618 378

2 = Pin: 0 986 618 128

Continue: III05/2

Fig.: III23/2

KME00047



## ASSEMBLING ALTERNATOR

### Installing regulator:

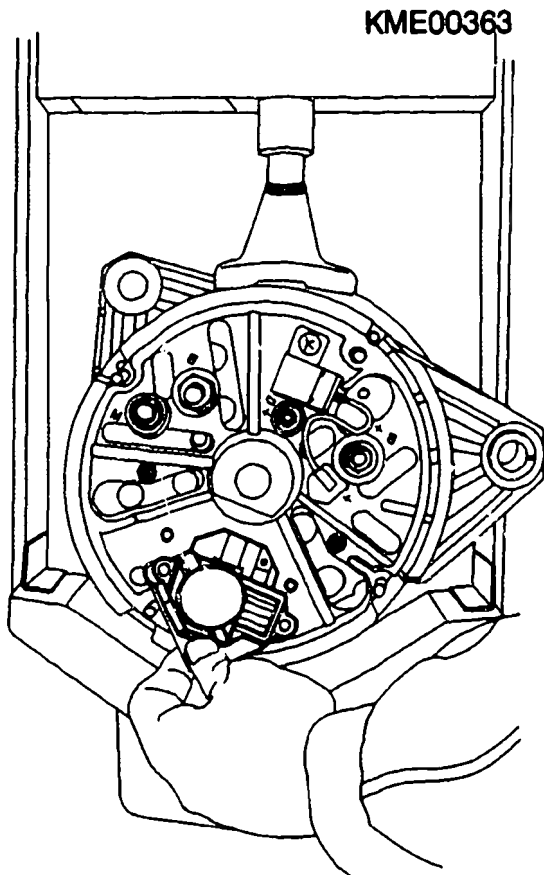
Slip pin into hole on front of regulator. Press sliding contact into guide until pin is felt to engage and fix sliding contact in position. Carefully swivel regulator into collector-ring end shield and pull out pin. Position regulator over tapped holes provided and screw on.

Tightening torque: 1,3...1,7 Nm

Pin: Diameter 1..1.3 mm x 40+-10  
(paper clip)

Continue: III25/1

Fig.: III24/2





## ASSEMBLING ALTERNATOR

Installing regulator:  
(two-pole alternator)

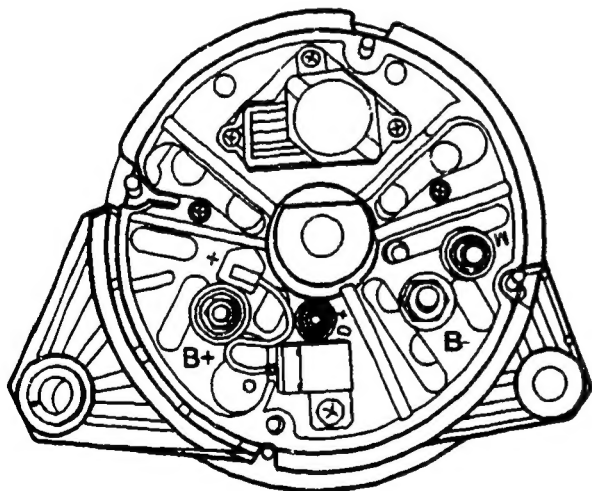
Attach wire to alternator B-  
terminal.

Tightening torque: 9...13 Nm

Continue: III05/2

Fig.: III25/2

KME00364



## ASSEMBLING ALTERNATOR

Attaching capacitor:

Screw on capacitor.

Attach plug of capacitor to B + connection.

Two-pole alternators are provided with 2 capacitors for interference suppression.

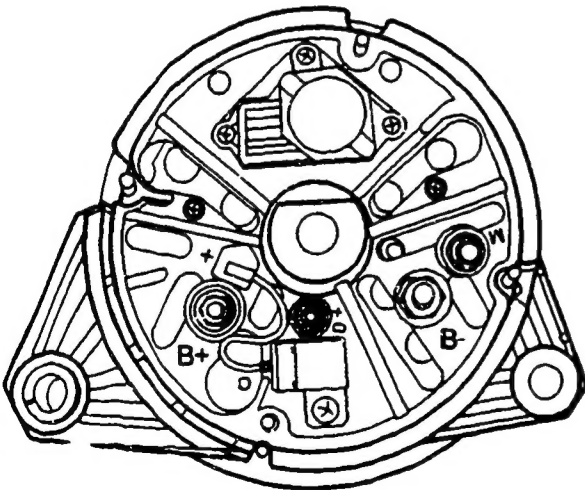
The second capacitor is also attached to the B- stud, as is the negative terminal of the regulator.

Tightening torque: 4,3...5,7 Nm

Continue: III05/2

Fig.: III26/2

KME00364



# ASSEMBLING ALTERNATOR

## Attaching air-intake cover:

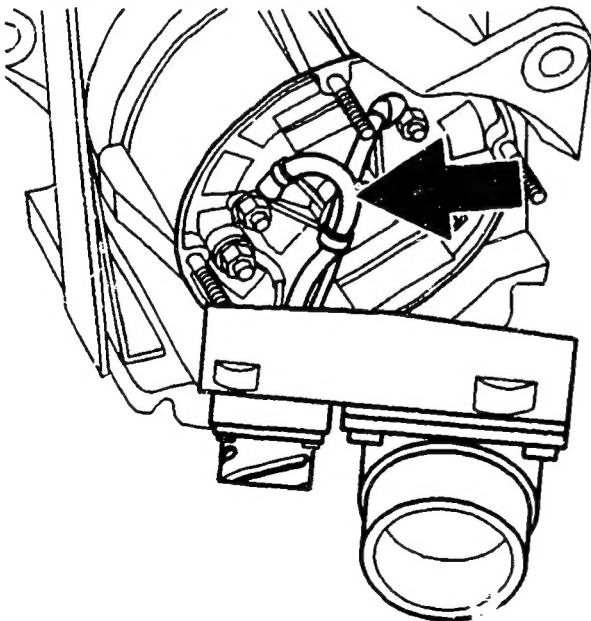
On alternators with air intake and plug section the wiring harness of the plug section is connected as follows to the alternator.

Plug pin		Alternator connections/ tightening torques
A	= >	B- : 3...3,4 Nm
B	= >	D+ : 2,5...3,3 Nm
C	= >	B+ : 3...3,4 Nm
D	= >	W : 1,3...1,7 Nm

Continue: III05/2

Fig.: III27/2

KME00020



**EDITORIAL NOTE**

**Copyright 1998 ROBERT BOSCH GmbH  
Automotive-Equipment After-Sales  
Service  
Technical Publications Department  
KH/VDT,  
Postfach 30 02 20, D-70422 Stuttgart**

**Published by:  
After-Sales Service Department for  
Training and  
Technology (KH/VSK).  
Time of going to press 06.1998.  
Please direct questions and comments  
concerning the contents to our  
authorized representative in your  
country.**

**Continue: III28/2**

**EDITORIAL NOTE**

**The contents of this microcard are  
intended only for the Bosch Franchised  
After-Sales Organization. Passing on  
to third parties is not permitted.**

**Microfilmed in the Federal Republic of  
Germany.**

**Continue: I01/1**